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CONTENTS.

EDITORIALS: PAGE.
- To Employers in Any Part of the World ... 145
- Sell Coal by Assay, Like Ores ... 145
- Uses of Aluminium Alloys in Wrought-Iron or Mitis Castings ... 145
- The Pittsburg Meeting ... 146

CORRESPONDENCE:
- Remarkably Good Tunneling Work ... 147

- A Light Transit for Topography ... 147
- Flue-Dust ... 148
- The French Crown Jewels ... 149
- The Classification and Composition of Pennsylvania Anthracites ... 150
- The Distribution of the Manganese in the Spiegel Furnace of the Lehigh Zinc and Iron Company ... 151
- The United States Bessemer Steel Industry—Thirty-four Works ... 152
- Modern American Methods of Copper Smelting ... 153
- Patents Granted by the United States Patent-Office ... 154
- Furnace, Mill, and Factory ... 155
- Labor and Wages ... 155
- Transportation Notes ... 156

NOTES:
- Electrolytic Precipitation of Copper 146
- United States Imports and Exports of Coal ... 147
- The Simplon Tunnel ... 147
- The Average Heat Value of Well Purified Coal-Gas ... 149
- Armstrong and his Ordnance in Italy ... 151
- Tall Chimneys ... 151
- A New Open-Hearth Furnace for Iron and Steel ... 151
- Fuel Consumption in Rolling Wire Rods ... 151
- Compressed Lime Cartridges ... 152
- Beautiful Marbles in Algiers ... 154
- Philadelphia Gas-Works Suit ... 154
- Fossil Human Footprints ... 154

NOTES: PAGE.
- The Settle Water Cartridge for Fiery Coal Mines ... 154
- Gold and Silver in Russia ... 154

COAL TRADE NOTES:
- Illinois ... 156
- Iowa ... 156
- Montana ... 156
- Pennsylvania ... 156
- Wyoming ... 156

GAS AND OIL NOTES ... 156

GENERAL MINING NEWS:
- California ... 156
- Colorado ... 156
- Dakota ... 157
- Mexico ... 157
- Michigan ... 157
- Minnesota ... 157
- Montana ... 157
- Nevada ... 157
- New Mexico ... 158
- South America ... 158
- Utah ... 158

MARKETS:
- Silver, Copper, Tin, Lead, Spelter, etc. 158
- Iron Market Review ... 158
  - New York ... 158
  - Philadelphia ... 159
  - Louisville, Ky. ... 159
- Coal Trade Review ... 159
  - Statistics of Coal Production ... 159
  - New York ... 159
  - Buffalo ... 160
  - Boston ... 160

FINANCIAL:
- Mining Stocks ... 161
- Coal Stocks ... 161
- Boston Copper and Silver Stocks ... 162

Advertisers' Index ... xii

EMPLOYERS in any part of the world who require the services of superintendents, mining or civil engineers, metallurgists, chemists, mine or furnace foremen, or other assistance of this character, can have their wants advertised in the ENGINEERING AND MINING JOURNAL without charge.

SELL COAL BY ASSAY, LIKE ORES.

Mr. C. A. ASHBURNER has given, in a paper read before the American Institute of Mining Engineers, an interesting discussion of this subject. We give, on another page, extracts from this paper.

The figures obtained by Mr. ASHBURNER from average samples of anthracite coal just as it is shipped to market are very interesting, as showing that the percentage of ash is always much higher than is generally supposed, and as showing that the commonly received analyses must be taken as representing only picked samples. It would be a very easy matter to sample the coals as they are shipped by an automatic sampler that would give a correct average. And we hope something of the kind will be done. In the mean time, Mr. ASHBURNER'S sampling and analyses are extremely instructive if not startling, and show the advisability of buying coal by analysis, as ores are purchased. This is the only way in which the purchaser will be sure of getting what he wants. There would be no difficulty in establishing a scale of fuel ratios that would represent the actual economic value of coals containing given percentages of ash and fixed carbons, and the sampling and analyses could be very cheaply and easily made.

It is certainly very remarkable that so important and expensive an article as coal should be purchased without any test whatever of its value, and merely on the "say so" of the vender.

The company that will introduce this system of selling coal by analysis, or by its economic value as determined by actual test, will be a public benefactor, and will certainly gain a large business.

USES OF ALUMINIUM ALLOYS IN WROUGHT-IRON OR MITIS CASTINGS.

One of the most interesting subjects discussed at the Pittsburg Meeting of the Institute of Mining Engineers was the method of making wrought-iron castings, or, as they are called, mitis castings. This was described by Mr. PETER OSTBERG, of Stockholm, the inventor; and as his paper has not yet appeared, and as the subject is attracting great attention, we give a few particulars that will prove of interest.

The wrought-iron scrap is melted in plumbago crucibles in a special reverberatory furnace fired with petroleum. The crucible is covered, and a hole in the cover corresponds with and is directly under a hole in the top of the furnace. Additions to the charge of the crucible are made through these holes by means of a pipe, thus avoiding the necessity of opening and cooling the furnace. Wrought-iron fuses at a temperature of say 4000 degrees Fahr., and it would be necessary to heat it far beyond the point of fusion before it would be fluid enough to cast into fine molds and to make it possible to handle it before it would consolidate. Now it is in this superheating that the iron absorbs gases, and consequently it is impossible to make solid castings in this way.

In order to obviate this difficulty, Mr. OSTBERG has made use of the well-known fact that certain alloys of metals possess a fusing temperature much lower than that of the metals composing them. And among these, aluminium alloys are especially notable. In making mitis castings, a very small quantity, about $\frac{5}{100}$ of 1 per cent of aluminium, in the form of a 7 or 8 per cent aluminium alloy of cast-iron, is added to the charge (about 60 pounds) of wrought-iron in the crucible the moment this has been melted. The fusing-point is at once lowered some 500 degrees, and the charge, now an alloy of iron and aluminium, becomes extremely fluid and can be cast in the finest molds, while the great difference between its temperature and its fusing-point gives all the time necessary for manipulating it without danger of its solidifying. The extreme fluidity of the charge allows the ready escape of the gases, which otherwise would make a porous casting, and the result appears to be a remarkably fine, solid, and tough casting of wrought-iron.

These mitis castings are said to be from 30 to 50 per cent stronger than the iron from which they are made; but though aluminium undoubtedly greatly increases the strength of most of the metals with which it alloys, it is not credited with the increase of strength in this case; for it is said that, after hammering, the mitis metal loses its increase in strength and returns to the fibrous appearance and to the strength of the original iron.

The alloys of aluminium and iron and steel have long been known, and reference is made to the addition of such an alloy to steel by FARADAY only a few years after the discovery of aluminium; but this application to wrought-iron castings appears to be new, and it is certainly very interesting.

The aluminium alloy of iron used by the Swedish inventor at his works in Worcester, Mass., is made by the Cowles Electric Smelting Company, of Cleveland, Ohio, and it contains from 6 to 8 per cent of aluminium and from 1 to 1½ per cent of silicon. It costs about 40 cents a pound; but as only $\frac{5}{100}$ of 1 per cent of aluminium is required, the addition to the cost of the iron is very slight.

This utilization of this well-known property of an aluminium alloy to lower the fusing temperature of the iron is a very neat and clever application of a curious phenomenon, and it is said to have proved very successful in the case of mitis metal. Whether it will also facilitate the making of small steel castings is not stated; but it probably will make

the metal more fluid, and obviate the necessity of using those extremely high heats that now cause the steel to melt and run into the molding sand. We hope to be able, before long, to lay before our readers some data upon this important subject.

THE PITTSBURG MEETING.

The American Institute of Mining Engineers has met three times at Pittsburg, in 1872, 1879, and 1886. By accident or intention, the interval of seven years seems to have been set as the proper distance between the meetings, which are thus put as far apart as the "jubilee years" of the Children of Israel; and, if we may judge from the Pittsburg meetings hitherto, the term "jubilee" may be applied to them on grounds quite aside from their septennial character.

Certainly no other city in the country presents so many professional attractions to a society composed of engineers, metallurgists, and chemists. Pittsburg and vicinity, as Mr. SHINN'S striking summary shows, must at all times offer a multitude of instructive sights to the members of the leading technical body of the country. At this particular time, these usual elements of interest were reinforced by two special attractions, the Clapp-Griffiths manufacture of ingot metal and the new and wonderful application of natural gas as an almost universal fuel.

The transformation which the use of natural gas has wrought in the atmosphere of the "Smoky City" is evident at a glance to the visitor. Every day seems now as clean as Sunday. The hights across the river from the Monongahela House are actually visible all the time. There is a sky, with a sun in it; and fine weather can be clearly discerned and thoroughly enjoyed. During last week's meeting, moreover, the weather was exceptionally fine, to the surprise and delight of both hosts and guests; so that nothing alloyed the pleasure of the well-planned and well-managed excursions of the meeting. Much practice has made the Pittsburgers perfect in the art of hospitality; and their skill was never more lavishly exercised, or exercised upon a more appreciative body of recipients, than on this occasion.

The meeting was one of the most numerously attended in the history of the Institute. The central location of the place and the special attractions which it presented called out a very large attendance; and particularly noteworthy was the unusual proportion of the older members, whose presence in recent years has been less regular than in the early days when they were more imperatively needed to "help make a congregation." This feature alone would have distinguished the meeting for many of us, as a delightful reunion of friends long parted. No better representative of this feeling could have been found than PECHIN, of Cleveland, once "the gentleman from Dunbar," whose speech at the banquet of Thursday expressed, with a happy combination of humor and pathos, the associations, both jovial and tender, evoked by the great gathering.

Nothing can match the wonderful growth of Pittsburg during the last fifteen years, except the growth of the Institute itself during the same period. That neither of them has yet reached its maximum was made plain, on the one hand, by the signs of new and rapid increase in the city; and, on the other hand, by the election of the almost unprecedented number of 128 new members and associates of the society. The Institute has long since ceased to solicit additions to its membership. Indeed, after the first few months of its existence, its vigorous life was assured; and it could well afford to let applicants seek admission, not so much for its sake as for their own. The fame of its successful meetings, and still more, the value of its *Transactions*, have had their due effect; and now the ranks are kept full, and steadily increased, without any recruiting agency or advertisement.

The list of papers presented was the longest, we believe, ever offered at a single meeting. Many of them could only be read by title. But they will enrich Volume XIV. of the *Transactions*, which, as the Council announced, will be issued early, if the authors of this set of papers will be as prompt in preparing manuscript and reading proof as the previous authors of the year have been. At this moment, all the papers of the Chattanooga and Halifax meetings have been printed, distributed, and revised; and the sheets of Volume XIV. containing them have passed through the press. The work is farther advanced than ever before at the corresponding period of the year, though the volume promises to be the largest of its series.

Among the papers read, we must give the first place to the masterly description by Professor LESLEY, of the geology of the Pittsburg coal region—a singularly clear and graphic summary, in which the results of the faithful work of years, on the part of the State Geological Survey, were presented by its accomplished chief. The natural causes of the greatness of Pittsburg being thus lucidly set forth, Mr. SHINN'S paper on Pittsburg and vicinity, which statistically expressed that greatness, was perfectly complemented; and the residents of less favored localities were duly impressed with mingled awe, admiration, and envy.

Steel and iron naturally took precedence among the papers and discussions of the meeting; and we may roughly divide the papers on these subjects into four classes: the first comprising descriptions of iron mines and ores (the papers of Messrs. D'INVILLIERS, BLAKE, PULLMAN, LYMAN, and PORTER, of which the first, an elaborate account of the Cornwall mine, handsomely illustrated with maps and model, was the most important); the second, concerning pig-iron (papers of Messrs. SHIMER, BIRKINBINE, and GAYLEY, all three read by title only, and of Messrs. DUDLEY and GARRISON, the latter illustrated with microscope-slides and lantern-views); the third, relating to peculiarities of ingot iron and steel (the papers of Messrs. GARRETT, KENT, and A. E. HUNT); and the fourth, a class by itself, Mr. WITHEROW'S paper giving the latest results of practice with the Clapp-Griffiths converter. It goes without saying that the last subject was the metallurgical sensation of the meeting, though having been already discussed at several preceding meetings, it could not be said to have the quality of novelty or surprise; and after all, the sensation was not in the lively discussion, but in the thing itself, which was seen in actual, successful operation, at the works of OLIVER BROTHERS & PHILLIPS, not only by the crowd which formally visited those works at the time appointed for the general excursion, but also by numerous smaller companies, that stole away from the sessions to get private views of the famous converter, and to satisfy themselves that it was running all the same, at hours when visitors were not expected. It can not be said that the discussion threw much light on the theory of the matter. The questions raised by Mr. HOWE, whether there is indeed a new process in the case, or only an apparatus; and whether the results obtained could not be reached by suitable manipulation of the ordinary Bessemer converter, remain to be vigorously disputed hereafter. But the practical demonstration that the Clapp-Griffiths plant, as improved by Mr. WITHEROW, is capable of good and profitable work, is complete. What remains, concerns chiefly—to speak with plainness—the patentability of its essential features, and the essentiality of its patented features. With these questions, as such, the Institute has nothing to do directly, though the searching technical criticism of its discussions may indirectly affect them. Certainly Messrs. WITHEROW and OLIVER have shown enterprise and perseverance, and introduced a practical manufacture of great importance, for which we hope they will receive, whether in profits, royalties, or fame, or all together, an adequate reward.

Thursday's banquet was an overwhelming success. From the moment when President BAYLES took his seat behind the miniature derrick, with its flaming plume of real natural gas, which adorned the center of the table, to the time when he was paralyzed, midway in his farewell speech, by the apparition of two huge ceramic monstrosities (melting-pots from METCALF'S works) crammed with incredibly vivid and colossal paper flowers and feathers, and borne up the hall by a stalwart son of Africa, to be presented, with a speech from the eloquent RICKETSON, to the retiring President—or rather, to the time when his reply to that same speech was incontinently drowned by the band, which ruthlessly rang him down as he had rung down others, when their time was up— Where's the beginning of this sentence? Never mind; as old Father TAYLOR, the sailor-preacher, said, "Brethren, I've lost my nominative case; but I'm on the road to glory!" What we were going to say, and will say, if the columns of the JOURNAL hold out, is that, from the beginning to the end, the dinner was brilliant and entertaining. Besides the series of short and clever speeches, there were successive surprises, some spontaneous, some accidental, and some planned beforehand, which kept the company on the *qui vive*, and produced much laughter. But we are not going to tell about them. The charm of the Institute dinners is, that nobody can get an interior view of them from the outside, because the ruffianly Press is not allowed to turn them inside out.

The ladies were there—bless you! the ladies can't be kept away from the Institute meetings. And there was a new man to speak for them at the dinner; and very well he did it, to the joy not only of the fair subjects of his oratory, but also of the routine post-prandial orators of the Institute, who welcomed the advent of a fresh hand. But we must judge cautiously. One capital speech may be made by happy accident. If this man does as well next time, we will call him by name, and make him immortal. And the name we will then use will be MEIER, of St. Louis.

Electrolytic Precipitation of Copper.—W. E. A. Hartmann, of Swansea, has taken out a patent for the prevention of "polarization" of the electrolyte when copper is precipitating by electrolysis from a solution of sulphate of copper, using insoluble anodes. He introduces sulphurous acid gas into the liquor, which is at the same time warmed either by taking the gas directly and hot from kilns, or calcining-furnaces, or by passing steam in lead coils. The baths are covered with well-fitting covers, which have pipes leading from them to carry off the excess of sulphurous acid gas. By this employment of sulphurous acid gas, the oxygen liberated at the anodes is at once absorbed and neutralized, combining with the sulphurous acid to form sulphuric acid. The free acid so produced helps to keep the bath in good order as to conductivity until nearly all the copper is removed. When, finally, very little more copper remains in the liquor, it is drawn off, and a portion may be used for extracting fresh quantities of copper from ores, calcined mattes, etc., or may be worked up in some other way.

CORRESPONDENCE.

[We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.]

Remarkably Good Tunneling Work.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The following item appeared in your issue of February 6th:

"REMARKABLY GOOD TUNNELING WORK.—At shaft No. 17 of the new Croton Aqueduct, for the week ended January 23d, the contractors drove 110 feet of tunnel with two Rattler drills in each heading, and two dynamic drills on each bench. This is remarkable work, considering that the rock is hard mica hornblende schist, and is certainly a 'card' for the manufacturers of the drills used. Let us hear from any one who has done better."

Since you court comparison, permit to say that the work done at shaft No. 17 (even granting it to be as above) does not appear quite so "remarkable" in view of what has been done at other shafts on the same line.

I will not ask you to accept my unsupported statements, but will refer you to the official figures of the "Engineer's Report of Weekly Progress up to January 30th," from which the following data are compiled, for the purpose of making the comparison in the most fair and impartial manner possible, not only as to the best single week's driving, but also as to the best progress for twelve consecutive weeks in each heading, which is certainly a fairer test by which to judge of the efficiency of the drills used, than from a single week's run.

COMPARISON OF WEEKLY PROGRESS IN SEVEN HEADINGS FOR THE TWELVE WEEKS ENDED JANUARY 30TH, 1886.

WEEK ENDED	17 North heading.	17 South heading.	9 South heading.	11 B South heading.	11 A North heading.	10 North heading.	10 South heading.
Nov. 14.	33	52	48	54	48	49	61·2
21.	28	52	54	46	55	44	36·0
28.	36	58	51	49	46	40·5	61·1
Dec. 5.	39	44	67	48	33	57·5	49·2
12.	55	00	67	63	44	54	9·5
19.	56	43	70	41	59	49	53·6
26.	27	14	58	46	43	27	39·0
Jan. 2.	39	27	55	43	46	44	39·5
9.	32	32	57	51	53	41	56·4
16.	00	00	61	50	57	52	47·0
23.	61	00	51	52	54	39	42·3
30.	54	47	21	49	47	57	53·2
Total progress for 12 weeks...	455	369	660	592	585	554	548
Average.....	37·9	30·8	55	49·3	48·8	46·2	45·7

I have selected from the engineer's tables the above five headings (outside of those at shaft No. 17) as being the headings that show the highest average progress, for the twelve weeks, of any on the line. In all of these, Ingersoll "Eclipse" drills are used, both in the heading and on the bench. The material is a hard granitic gneiss, and much harder than the micaceous formation at shaft 17, the north heading of which, in particular, is considered one of the easiest, if not the easiest, on the line.

According to the engineer's figures, the best week's record for the two headings at shaft No. 17 is 101 feet, the best heading of the two in that week showing a drive of 54 feet; but even taking the contractor's figures of 110, the average for each heading is 55 feet, while you will observe there are 13 weeks in the other five headings that show a higher rate of progress, ranging from 56·4 to 70 feet.

The work at shaft 9, south, with an average of 55 feet advance for twelve weeks, is not only truly remarkable, but is entitled to the credit of being the fastest driving that has been done on the line of the New Croton Aqueduct tunnel.

"Give unto Cæsar what to Cæsar is due." Yours truly, J. C.

A LIGHT TRANSIT FOR TOPOGRAPHY.

Written for the Engineering and Mining Journal by Benjamin Smith Lyman.

The transit illustrated in the accompanying sketch was designed and begun in 1872; though it was not finished (by Messrs. Heller & Brightly, of Philadelphia) until 1882. It has so far been little used, but seems, with one or two small alterations already made, to answer very well the purpose for which it was intended, namely, to serve as a light instrument for geological topography.

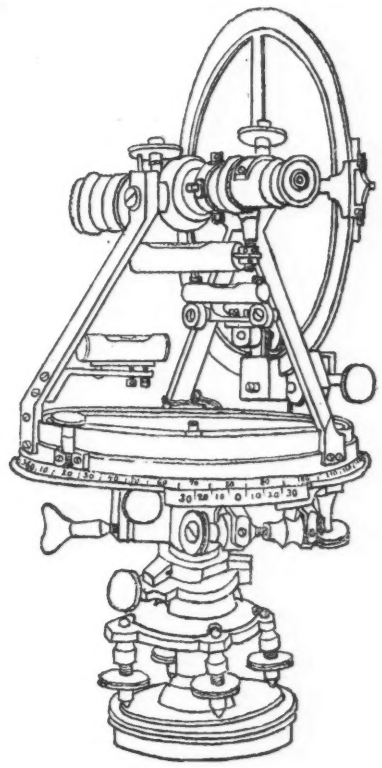
The transit itself weighs a little less than five pounds; the tripod-head, one pound and a half; the tripod just under five pounds; and altogether, less than 11½ pounds. Such lightness is, of course, extremely important in a country like America, where the surveyor must often carry his own instrument.

Yet nothing whatever has been sacrificed in the size of the graduated circles nor in the length of the compass-needle; and in this respect, there is no resemblance to the so-called "mining transit" of the same makers, and of the same cost. The compass-needle is a five-inch one, and the graduated circle for the compass is five inches in diameter, and the graduation of the vernier circle, and of the vertical circle likewise, has a diameter of 5⅞ inches. With both the horizontal and vertical verniers, then, it is easily possible to read to single minutes—a precision that is very ample for use with the best chaining or stadia work.

The lightness has been effected by a reduction in the size of the telescope, and the omission, as far as seemed possible, of all unnecessary portions of the ordinary engineering transit. The axis for the telescope, instead of having, as usual, a greater length than the compass-needle, with Vs at either end for support, is shortened to about two inches, little more than the diameter of the telescope, and rests upon a vertical, wide-spreading V (more exactly an A with its cross-piece) close to one side of the telescope, and on a single leg at right angles with the V and equally close to the other side; or, in short, on a tripod. That braces the axis very firmly and closely in two perpendicular directions, so as to give the very best, the strongest, and most invariable support. The vertical circle is attached to the outer end of the axis on the side of the V, and its two verniers are at the ends of arms attached to the top of the V. The clamp-screw is at the side of one leg of the V near the bottom.

The telescope is 7½ inches long, reversing in either direction; and the object-glass has a diameter of $\frac{1}{16}$ inch in the clear and a focus of five inches. The image is not inverted; otherwise, the magnifying power might be greater with the same length, and perhaps the slight inconvenience of inversion is, after all, not worth comparing with any decided increase of magnifying power. For its length, the telescope is already very good indeed. It is provided with adjustable stadia cross-hairs, so that the distances may be read from the leveling-rod. Apparently, a precision of one five hundredth might be expected from a single stadia sight of about two hundred feet; and that is quite sufficient for very good topographical work. Of course, the errors tend to balance one another, so that the precision of the sum of several sights increases according to the square root of their number. There is a level 4¼ inches long below the telescope, so that very good leveling may be done.

The lower plate that bears the horizontal verniers has been reduced to arms carrying the two verniers at their outer ends, 180 degrees



apart. The two vernier arms are connected by a long compound center of the best style with the upper (or compass) plate. The horizontal graduation is on the beveled edge of the upper plate; and the verniers are made beveling to correspond. To protect the sharp beveled edge of the graduated plate from injury, there is a light thin metallic plate just curling over the edge of the graduation.

For convenience in leveling, a brass plug fits into a hole in the lower part of one of the four light spokes of the vertical circle, and screws into a piece of brass that is joined by set-screws to the bottom of the cross-piece of the A, so that the circle is adjusted and held with its zero against the zero of one of the two verniers. The plug is tied loosely by a string to one leg of the A.

For leveling up the instrument, there are two small tube levels perpendicular to each other, one attached to the V (just above the cross-piece of the A), and the other to the under side of the other telescope support.

Instead of the full vertical circle, a half one might be used, and would be a little less exposed to injury. But it would be somewhat less convenient to use, and could not have the benefit of the test of opposite verniers.

The graduations, of course, are all continuous, quite around each of the three circles.

The other arrangements are not essentially different from those of the ordinary large heavy transits; but naturally the tripod-head and the tripod are both much lighter, owing to the smaller weight they have to carry. The stadia and level rod for use with the vertical circle is only five feet long, bearing a small target at the top so nearly the same hight as the telescope that, with setting the transit at alternate stations in compass work, the level of the rod station also is in general obtained closely enough without any special allowance for the slight difference there may be in the hight.

NORTHAMPTON, MASS., Dec. 31, 1885.

United States Imports and Exports of Coal.—For the twelve months ended December 31st, reported by the Bureau of Statistics:

	Tons, 1885.	Tons, 1884.
Imports, Bituminous.....	792,472	801,077
Exports, Anthracite.....	645,310	643,066
Bituminous.....	540,736	698,952

The Simplon Tunnel.—Work has been begun on the Simplon Tunnel, by which the railroad line from Geneva to Martigny and Brieg will be carried through the Alps to Durno d'Ossola, and so on to Lake Maggiore, at a cost of about $20,000,000. This tunnel, when finished, will be twelve and a half miles long, and the largest tunnel throught the Alps.

FLUE-DUST.*

Written for the Engineering and Mining Journal, by Malvern W. Iles, Ph.D.

(*Concluded from page 94.*)

Many methods for the condensation of smoke, fume, and dust have been proposed and used in connection with metallurgical works; and I am indebted to Mr. A. French for the following neat classification†:

(*a*) Deposition of the fume by its own gravity in long flues, with or without the addition of a series of settling-chambers, placed either near to or at some distance from the furnace.

(*b*) Filtering through flues, towers, or chambers containing brushwood, coke, coarsely woven fabric, or similar porous material, using water either in a constant or intermittent stream to keep the filters from becoming choked.

(*c*) The use of water, either in the form of steam, or in showers of drops or jets, projected with some considerable degree of force into and across the current of smoke.

(*d*) Processes based on the inverse of the preceding principle, namely, passing the smoke under and through a depth of water, either in great volumes, as in the old Stagg's condenser, or in a more or less comminuted condition.

In addition to the above, we would add:

(*e*) The use of metallic plates hung in the dust-chambers, as at Ems,‡ Germany, and finally,

(*f*) The use of electricity.§

Many able metallurgists still think that long flues are the simplest, the least expensive, and the most effective method that has been used.‖

The advantages and disadvantages of this method have been so fully described by so many writers, and are indeed so apparent to those having experience on this subject, that we need not dwell upon them here.

Under the second division (*b*), I think we should place the so-called Lewis-Bartlet process, where the essential feature is filtration through cloth.

If the flue-dust or lead fume is filtered through coarsely woven fabric, the principle certainly is the same, whether we use "water, either in a constant or intermittent stream to keep the filters from becoming choked," or whether we take a stick and pound the "coarsely woven fabric," or otherwise shake the cloth, to prevent it from becoming choked.

While it is not my object to attack the validity of the Lewis-Bartlet patent, which I am sure is a good and effective process, after having seen it work upon a small scale at Leadville, Colorado, yet I must add that the *idea* was suggested years ago, since in Dr. Percy's *Metallurgy of Lead* occurs this passage (page 449): "And I [some friend of Dr. Percy's] am convinced from many other experiments that, except for the heat and sulphurous acid, it would be possible to construct some textile fabric, through which the smoke might be slowly forced or drawn, leaving the bulk of the fume on one side."

Mr. F. L. Clerc gave some valuable data on the above-mentioned process in the columns of this JOURNAL (July 4th, 1885); some additional data were also given in this paper (September 4th, 1880) regarding the process as tried upon a small scale at Leadville, Colorado; and finally, Mr. Anthony Guyard has also furnished some interesting and valuable notes upon the Leadville experiments, which can be found in Vol. XIII. of the Tenth Census of the United States.

There seems to be considerable difference of opinion as to the amount of arsenic contained in the product that was caught by the "Bartlet filter." Whether this variation was caused by using different samples, or whether the arsenic results were in some way confounded with determinations that were then making upon arsenical speiss, I am not able to say at this time. It is reasonable to suppose that, inasmuch as the ores in only a few cases contained an appreciable amount of arsenic, the dust also contained but little arsenic.

The use of steam (see division (*b*)) would at first suggest itself as theoretically the most perfect mode of applying water in dust-chambers, owing to the fact that it would be more uniformly mixed with the smoke; but the condensation of the steam into precipitable drops has been found to be very difficult, inasmuch as the fog produced would drift along the chamber, and in every way act similarly to the smoke itself; for this reason, where steam has been tried, the process has generally been soon abandoned, and the method, therefore, is not to be recommended.

By exposing the smoke to fine sprays or jets of water, we unquestionably do much good; yet there is still much to be desired, even by the most thorough application. Some of the advantages of sprays we have found in practice to be the following: The temperature of the chamber is reduced; many of the coarser particles are precipitated; the dust is caused to adhere to the sides of the chamber, giving additional surface exposures; the moistened dust prevents the dripping tendency toward the stack, which, in our experience, we have noticed to be a serious evil; and then, again, labor is saved, since, by wetting it in the chamber, we save the labor that would be necessary for wetting the dust after its removal in a dry state; furthermore, we preserve the health of the workmen, since they do not become lead poisoned by removing wet or moistened dust from the chambers; and finally, we suffer fewer mechanical losses in the handling of wet dust than when handling it in a dry state.

I have seen it stated that a dry flue deposits fume more freely than a wet one. While the statement was not substantiated by any evidence or proof, I will say that it is not necessary to have what would be called wet chambers in order to successfully apply sprays. We think that the advantages of sprays, as given above, are sufficiently numerous and important for their use wherever they can be applied, and we think the cases are exceedingly limited where sprays can not be applied if we use the right kind. When we first began to work on this subject of introducing water into dust-chambers, we took a series of brass sprinklers similar to those used for gardens and lawns, and caused water to be forced through them under considerable pressure; in this case, we had long pencils or threads of water passing at right angles to the direction of the smoke. Now, while this did some good, yet it did more harm, since pools of water would collect near these nozzles, the pools at intervals bursting out under the sheet-iron doors, giving rise to much annoyance; furthermore, the brick walls composing the chamber were too strongly wetted, and would in the course of time be destroyed. We were satisfied that, in the case of steam, the drops were entirely too fine or small, and in the case of the ordinary sprays, the drops were entirely too large, and too much water was introduced, which was too local in its action. Now, to find a mean between these two methods was exactly what we wanted, and which has been the source of much experimenting.

Mr. Frederick Keiper and myself have recently patented sprays that

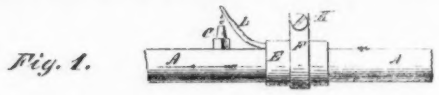


Fig. 1.

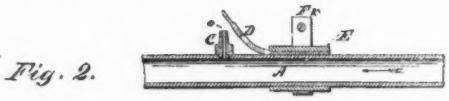


Fig. 2.

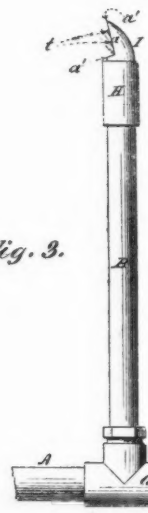


Fig. 3.

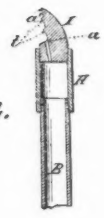


Fig. 4.

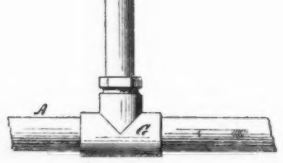


Fig. 5.

we have found in practice to be very effective. We will proceed at once to explain these various sprays, endeavoring to be as brief as possible, inasmuch as we propose to return to the subject at some future time.

In Fig 1, *A* is an ordinary gas-pipe, having a diameter of from half an inch to one inch; the pipe *A* is placed in the dust-chamber, and is duly supported by hanging it to the binding-rods of the chamber, or in any other convenient manner. At intervals of every 4 to 6 feet, there are screwed into the pipe ordinary gun-tubes or nipples *C*. Now, water passing through the pipe *A*, and having an outlet through the nipples *C*, will cause long pencils or streams of water, which will vary, of course, in hight, according to the degree of pressure. These round streams of water we break up into very beautiful sprays by interposing a small flattened plate of copper *D* (or other suitable metal), which copper strip is attached to the pipe *A*. In practice, we take a piece of old rubber hose *E*, slip it over the plate *D*, and then slip the hose clamp *F* over the piece of rubber, and tighten the pieces securely by use of the screw *K*.

It will be readily seen that the pipe *A* may be placed on the outside of the chamber, and then have as many pipes running through the dust-chamber wall at right angles as we may desire. In the latter case, the nipples are screwed into the end of a pipe-cap, and the metal strip *D* is so bent as to break the stream of water. Another form of sprayer, and based upon the same principle, is shown in Figs. 3 and 4. In this case, *A* is the delivery-pipe; *G*, an ordinary T-joint; *B* is a gas-pipe running at right angles to the pipe *A*; *H* is a sleeve, and in this sleeve is a leaden plug of a peculiar construction, as shown in Fig. 4. A fine stream of water issues through the small orifice *a*, and, striking with considerable force upon the inclined surface *I*, is broken up into most beautiful sprays. There are ridged surfaces *t*, which not only make the spray more nearly approach perfection, but also serve to prevent drops of water. Both these forms of sprayers are simple, cheap, and at the same time remarkably effective. We have recently placed an inch pipe the entire length of the dust-chamber, and then run small rubber hose at right angles to this delivery-pipe. In the end of the rubber hose, is placed a small leaden plug, having a straight hole one sixteenth of an inch in diameter. The water issuing through this small hole is broken up by striking suitable plates into a fine spray, at the top of the dust-chamber. The fourth class (see division (*d*)) has for its principle bubbling or passing the smoke through water; and while there is much valuable material saved in this way, yet the plan is an expensive one, hard to keep in good running order; the product is in a bad shape for subsequent treatment, and there are, in short, many practical objections to its use, and it has been generally abandoned where it has been tried. The old Stagg condenser, based upon this principle, is practically obsolete.

Mr. A. French, in connection with Messrs. H. J. and J. W. Wilson, of

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* Copy-right 1886, by the Scientific Publishing Company.

† *See* paper read before the British Association for the Advancement of Science (Section B), 1879. For synopsis, see *Scientific American Supplement*, entitled, "Lead Fume, with a Description of a New Process of Fume Condensing."

‡ *See* Professor Egleston's article in the Transactions of the American Institute of Mining Engineers.

§ *See* ENGINEERING AND MINING JOURNAL, July 18th, 1885.

‖ *See* Dr. Percy's views, page 437, in his treatise on lead; also the views of "an experienced British lead smelter," page 450.

the Sheffield Smelting Company (England), made a number of very interesting experiments, showing that the "mere bubbling the smoke through water from a perforated pipe, for example, has little effect in stopping fume." This fact they demonstrated on both the small and the large scale.

If a glass plate be coated with flue-dust, and we allow water to drop upon it while it is held at an angle of 60 degrees to the horizon, the drops are reflected off without wetting the plate.

It was proved that, by passing fume through ordinary rape-seed oil, it would catch more than three times as much fume as it would by passing it though water. This fact is ascribed to the oil having "less than half the surface tension of water." Now, in order to destroy the surface tension of the bubbles, Mr. French, in connection with others, has devised a new and interesting method of saving fume, in which it is claimed that the method will save from 95 to 98 per cent of the metallic contents of the smoke. This method may be briefly described in the authors' own words as follows: "We use wire gauze having 15 meshes to a linear inch, the meshes being one twentieth of an inch wide. A number of diaphragms are arranged one above another, in horizontal planes, and at small distances apart. The whole is submerged in water. The smoke is equally distributed under these by means of a horizontal series of perforated pipes." A Root blower is used to force the smoke though the apparatus. The above method is worthy of a thorough investigation by those specially interested in metallurgical pursuits.

The following illustrations show another form of sprayer, also protected by patent:

Fig. 1.

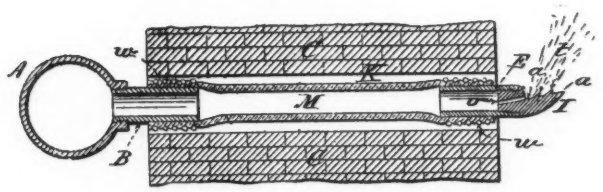


Fig. 2.

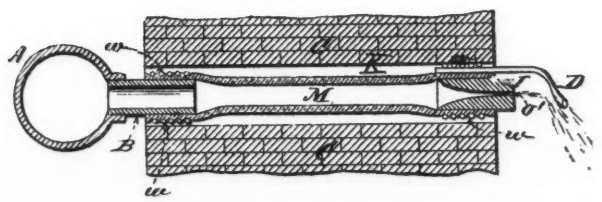
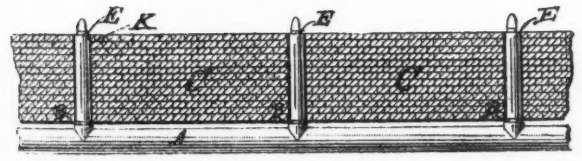


Fig. 3.



The method of hanging sheet-iron plates in flues is a good one where the flues are long; but where the flues are short, we have very good reasons for believing they do more harm than good, since, by hanging a number of plates parallel with the course of the smoke, we find that through the spaces between the plates the smoke is caused to rush with an increased velocity, and immediately under the plates we shall have but little deposition of dust, but it will pass on and deposit either under or near the stack. The absence of much dust immediately under the plates was soon noticed by the workmen in cleaning out the chambers; but, thinking that there was a possibility of this view being a mere whim or speculation, I left the plates hanging for eight months, in order thoroughly to satisfy myself on this point. Of course, the plates will catch considerable fine soot-like material, which is rich in lead; but they cause, in our experience, the above-mentioned evil, which is not compensated for by the few pounds of material that adheres to the plates.

The use of electricity for saving flue-dust is new and very promising, and I regret that I am not able to furnish some experimental data at this time. (*See* ENGINEERING AND MINING JOURNAL, July 18th, 1885.)

Prof. Oliver J. Lodge and Messrs. Alfred O. Walker and W. M. Hutchings have recently kindly informed me that this subject is vigorously pushed at the Dee Bank Lead-Works, Bagillt, England, and it is to be hoped that some of these gentlemen will soon present additional data bearing on this subject of the condensation or saving of flue-dust, which we think is one of the most interesting and complex metallurgical subjects.

In conclusion, I will say that there have been tried and suggested many ways that have in view the saving of dust, and that many patents have been granted on this subject, some of them valuable and containing good points, while others are, to say the least, wholly impracticable. Some of the methods that have been tried or suggested are tortuous chambers, large rooms with or without hanging curtains; various kinds of wire screens, which may be placed either vertically or at some angle, either stationary or given a motion by the use of machinery; long sheet-iron, copper, or wooden pipes, troughs, or boxes, with or without hoppers, into which the dust is allowed to settle. Aside from these various methods, there are scores of others that the mind tires in contemplating.

The methods we think best are: Long chambers, water-sprays, filtration through woven fabric, and electrical appliances.

THE FRENCH CROWN JEWELS.

The Chamber of Deputies, Paris, France, has agreed that the crown jewels should be sold, to provide a fund for aged workmen. It is estimated that the jewels that are to be sold will provide $40,000,000. Some that are of historic interest will go to the Louvre collection. The gems of artistic and educational interest, valued at 13,000,000 francs, will be handed to the Museum and School of Mines. The imperial crown and the swords that belonged to Louis XVIII. and the Dauphin will be melted in order to prevent the possibility of their falling into the hands of showmen. A commission of jewelers and connoisseurs of jewels, appointed four years ago to value the crown diamonds, and to say which, if any, should be retained, recommended that a certain number of jewels or jeweled objects should not be sold; and their advice is to be complied with, save in regard to the foreign decorations and the insignia of the Legion of Honor worn by Napoleon III. "These," says the report on the subject, "recall no historical souvenir." The government does not, however, propose to sell the famous "Regent," which was acquired by that Regent of Orleans to whom it owes its name, for £135,000 sterling. Diamonds, like countries, have their histories; and poor indeed is the diamond that has none. These attractive stones were, according to the ancient Jewish legend, invented by the fallen angels with the view of tempting the daughters of men; a purpose for which it can not be said they have proved unfitted. Apart, however, from the great aim with which they were brought into the world, they have been associated with villainy of various kinds. The Orloff diamond is said to have been stolen by a French deserter from the eye of the figure of Juggernaut; and a like story was told of the "Regent," although, according to another version, it was stolen not from a god, but from a slave who had found it in a mine, and was in the habit of carrying it about in a wound that he had made expressly for its reception in one of his legs. This stone has the reputation of being the purest, if not the largest, of famous diamonds. The kings of France wore it in their crown. Napoleon, however, carried it, with significance, in the hilt of his sword. Had he not done so, it would not for a time have been lost to France, as it in fact was when, at Waterloo, it fell into the hands of the Prussians. After the Restoration, it went back to France; and that it might not a second time become, if only temporarily, the property of the Prussians, it was conveyed in 1870, when the capital was about to be invested, from Paris to Tours, and from Tours to Bordeaux. It has had strange adventures, too, in France itself. Thus, under the Consulate and the Empire, it remained in the possession of M. Vanderberghe, who held it as a guarantee for the repayment of a state loan, and meanwhile lent it to his wife to wear to evening parties, replacing it in his strong-box by an excellent imitation in crystal, which is said on more than one occasion to have been exhibited as the original to the authorities charged with the duty of visiting it.

From the year 1476 until 1774, the number of diamonds formally inventoried as "belonging to the crown" was 7482. This total, representing a capital of 20,000,000 francs, included the famous "Regent," valued at 2,500,000 francs. During the reign of Louis XV., 1471 of these diamonds were sold, but others were bought, chiefly for the ornamenting of court costumes, diamond buttons and sword-hilts enriched with brilliants being all the fashion at the court of the "beloved" monarch; so that when Louis XVI. came to the throne, he found himself the fortunate possessor of 9547 diamonds of different sizes. In 1792, a great many of these—among them the "Regent"—were stolen from the Garde Meuble; but shortly after their disappearance, an anonymous letter reached the government of the Convention, stating that they would be found buried in the Allée Neuve of the Champs Elysées, where, in fact, they were discovered. From 1807 to 1810, Napoleon I. bought up all the scattered crown jewels that his agents at home and abroad could trace, and the inventory taken of his acquisitions in the latter year exhibited a total of 37,393 brilliants and precious stones of various kinds, valued at 18,923,477 francs. During the Reign of Terror, however, France had irrecoverably lost the "Sancy" diamond, purchased by Charles the Bold in 1476—a magnificent opal, known as the "Fire of Troy"—and the renowned "Blue Diamond." Another magnificent brilliant, which Napoleon had carried about him for years during his many campaigns, was mislaid or dropped by him at the battle of Waterloo, and has never since been restored to the French national collection of precious stones.

The Average Heat Value of Well Purified Coal-Gas.—This, at constant volume, has been recently determined by M. Witz—*Ann. de Chim. et de Phys.*—as about 5200 calories per cubic meter at 0 degree, and 760 mm. when the water formed is fully condensed. This value, got from a great variety of experiments with gas from different works, appears to make the generally accepted figure of 6000 calories about 15 per cent too high, and the calculation of gas-motors is here concerned. The heat value of the gas from one and the same works varied in the course of a year from 4719 to 5425 calories, which was more than the variation between different works. The influence of temperature and external pressure was not perceptible. The operations for purifying gas diminish the heat effect sometimes as much as 5 per cent. *Nature* says that the gas of the last hour of distillation is, contrary to the usual view, less rich than that of the first hour. Dilution with oxygen lessens the heat value; but in dilution with air, curiously, no such effect was observed; the heat of combustion was the same with six or with ten volumes of air.

THE CLASSIFICATION AND COMPOSITION OF PENNSYLVANIA ANTHRACITES.*

Extracts from a paper by Charles A. Ashburner, Geologist in Charge Pennsylvania Survey, Philadelphia, Pa.

One of the most extensively discussed questions connected with the Pennsylvania anthracite and bituminous regions, and one about which the most unsatisfactory conclusions have been arrived at, has been the classification of the coals. The following classification is suggested by Mr. Ashburner :

Classes of coals.	Ratio $\frac{C}{\text{Vol. H. C.}}$:1
Hard-dry anthracite	from 99 : 1 to 12 : 1
Semi-anthracite	from 12 : 1 to 8 : 1
Semi-bituminous	from 8 : 1 to 5 : 1
Bituminous	from 5 : 1 to 0 : 1

The coals of the producing collieries during the year 1884 have been classified under the general heads in the following table, which, in addition, shows the number of collieries producing each kind of coal, and the amount in tons, and percentage of each :

Character of coal.	Number of collieries.	Production 1884, Tons.	Percentage of total production 1884.
1. Free-burning white ash	213	17,109,523	52·41
2. Hard white ash	105	9,206,639	28·20
3. Wyoming red ash	14	1,757,965	5·30
4. Lehigh red ash	11	1,510,424	4·63
5. Shamokin	29	1,409,854	4·32
6. Lykens Valley red ash	8	1,145,008	3·50
7. Schuylkill red ash	14	227,467	·71
8. Trevorton	2	116,695	·36
9. Lorberry red ash	4	101,836	·31
10. Bernice white ash	1	86,018	·26
Total	401	32,641,499	100·00

Mr. Joseph S. Harris, in speaking of the characteristics of the coals produced from the properties of the Philadelphia & Reading Coal and Iron Company, in the Western and Southern fields, defines the characteristics of many of these different varieties as follows :

1. *Free-burning White Ash.*—"The distinction between it and the hard-burning white ash coal is, that under such a fire as is ordinarily used for smelting metals or producing steam, the impurities melt or clinker, which is not the case with the harder coal. This practical test is not, however, a very exact one. Some of the anthracites can be clinkered with a strong draught and with a thick bed of fire, and would, by a person who used them under such circumstances, be classed as free-burning, while another, whose method of burning was more economical, would call them hard. Analysis shows that the free-burning white ash coals are quite as rich in fixed carbon, and that they have even higher heating power, as tested by the amount of water evaporated, than the harder variety, but their limited range of usefulness, which is due to their clinkering, prevents their price rising as high as the hard white ash coals."

2. *Hard White Ash.*—"It is in great request for blast-furnace and locomotive purposes, having, to an unusual degree, the qualities of resisting change of form under high heat and pressure, and owing to its high percentage of carbon, it is valuable for producing steam ; but for domestic use on a small scale, and for open-grate fires, it does not ignite readily enough to be a favorite."

The (3) Wyoming red ash, (4) Lehigh red ash, and (10) Loyalsock white ash are not referred to in Mr. Harris's report. The Wyoming red ash is similar in its general characteristics to the Schuylkill red ash. The Lehigh red ash is very similar to the hard white ash produced from the same region, with the exception of the color of the ash, due to the presence of iron, the same as in the softer red ash from Schuylkill, while the Bernice white ash, as a fuel, is rated by many coal men as being similar to the Lykens Valley coal, except in the color of the ash. The geological structure and physical characteristics of the Bernice and Lykens Valley beds are, however, quite different.

5. *Shamokin.*—"It follows in hardness, and in ease of ignition, next after the free-burning white ash coals, and is used still more especially for domestic purposes, its lower percentage of carbon making it ill-adapted for purposes requiring intense heat."

6. *Lykens Valley Red Ash.*—"It burns with considerable flame, and is greatly liked in the Eastern market for open grates, other domestic uses, and for steam and heating purposes, wherever quick heat is required."

7. *Schuylkill Red Ash.*—"Is easily ignited, easy to keep burning, and where used in open grates makes less floating dust than white ash coal, because its ash is composed of larger particles, and on account of the oxide of iron, which constitutes its coloring matter, has greater specific gravity than the ash of the white."

8. *Trevorton or North Franklin White Ash.*—"The coal is pure, but its heating properties are rather low, and it is of so friable a nature that it does not stand transportation well."

9. *Lorberry Red Ash.*—"It burns with a little flame, and is much in request for domestic uses in the Eastern market."

If the amount of combustible matter in a coal is any criterion of its fuel value, an examination that has recently been made by the survey shows how ignorant we are as to the actual worth of the different coals that we burn, and how readily we may be deceived by the special characteristics of a coal that we may have noticed, and by which we may have judged of its heating capacity.

In order to test the value to be attached to the judgment of the trade in discriminating between different coals, one of the largest miners and shippers of anthracite coal, who has for a great many years been connected with the mines over a wide area in the region, was requested to name a number of coals, which were credited, by most consumers, with about equal value. Samples of these coals were collected from one or two hundred tons, as they were ready to be shipped to market ; the amount collected for each analysis ranging in weight from one to two hundred pounds, which was then reduced by the ordinary methods now commonly used in sampling any mineral product for qualitative and quantitative tests. The number of samples obtained in this way was thirty-three, of which Mr. McCreath reported the analyses (which are given in Mr. Ashburner's paper).

* Read at the Pittsburg Meeting of the American Institute of Mining Engineers, February, 1886.

AVERAGE COMPOSITION OF PENNSYLVANIA ANTHRACITE.

No. of specimens.	Name of coal-bed.	Name of coal-field.	Chemical analysis.* Water.	Volatile matter.	Fixed carbon.	Sulphur.	Ash.	Total.	Specific gravity.	Percentage of constituents of fuel. Fixed carbon.	Volatile combustible matter.	Fuel ratio. C. / V. H.—C.
3	Wharton	Eastern Middle	3·713	3·080	83·404	·585	6·218	100	1·620	96 56	3·44	28·07
5	Mammoth	Eastern Middle	4·119	3·284	86·370	·496	5·922	100	1 617	96 55	3·45	27·99
2	Primrose	Western Middle	3·541	3·710	81·749	4·9	10·6 4	1 0	1 651	95·64	4·36	21·93
5	Mammoth	Western Middle	3 163	3 717	81 143	·89?	11·078	100	1·657	95·62	4·38	21 83
2	Primrose? Ft.	Southern	5·048	4·125	87 982	·56 6	4·379	100	1·684	95 52	4·48	21·32
2	Buck Mountain.	Western Middle	3 042	3·340	85 692	·462	7·8 5	100	1 667	95·44	4·56	20·93
1	Seven Fot	Western Middle	3·4 0	3 9 8	80·86	·512	11·232	10	1 651	95·31	4·69	20·32
7	Mammoth	Southern	3 087	4 ·75	83 813	·641	8·184	100	1 631	95 15	4·85	19 62
3	Mammoth	Northern	3 421	4 381	83 208	727	8·203	100	1·575	95·00	5·00	19 00
	B. Coal Bed	Loyalsock	1 2 5	8·100	85·344	1·031	6 280	100	.....	91 14	8·86	10·29

The analyses given in the above table are of coals from all sizes (mixed), which were shipped from the different collieries. It is found in practice that, after the coal is passed through the breaker and screened into different sizes for shipment, the purity of the different sizes, as regards fixed carbon and ash, is very different. This is indicated by the following analyses of specimens collected from the Hauto screen-building of the Lehigh Coal and Navigation Company :

Kind of coal.	Water.	Volatile mat er.	Fixed carbon.	Sul-phur.	Ash.	Total.	Color of ash.
Egg	1·722	3 518	88 4·9	609	5·· 62	100	Light cream.
Stove	1 426	4·156	83·672	·572	10 ·174	100	Cream.
Chestnut	1·732	4·0 6	80·715	·841	12 666	100	Cream.
Pea	1·700	3 ·94	79·045	·697	14·664	100	Cream.
Buckwheat	1·690	4·058	76 918	·714	16 620	100	Cream.

These coals are separated into different sizes according to the mesh of the screen over which they pass. The sizes noted in the above table passed over and through sieve meshes of the following dimensions :

	Inches.		Inches.
Broken or grate	through 4		over 2·50
Egg	" 2·50	"	1 75
Stove	" 1·75	"	1·25
Chestnut	" 1·25	"	·75
Pea	" ·75	"	·50
Buckwheat	" ·50	"	·25

In preparing the coal for market, pieces of what is known as *bony coal* are picked out as worthless and thrown on the dirt-bank. The luster of this coal is dull, and it has a cannely appearance ; much of it is believed to be as good a fuel coal as that which is shipped from the same colliery to market. In fact, analyses recently made of three specimens of this bony coal, from a certain colliery, proved them to contain more fuel constituents than the coal which was sold to the trade. It has been suggested that the *good* bony coal be called "*cannel anthracite.*"

In the State report (GG), on the geology of Lycoming and Sullivan counties, a number of analyses of the Bernice or Loyalsock coal are given. The characteristics of this coal have been questioned from time to time, not only by the coal trade, but by analytical chemists, and in order to obtain some proof as to whether the analyses that have been previously made were of average samples, and indicated the general characteristics of the coal, other samples were collected during the past year, and have just been analyzed by Mr. McCreath, with the following results :

	"No. 1."	"No. 2."	"No. 3."	"No. 4."
Water at 212 degrees Fahr	3·070	·976	·654	·650
Volatile matter	15 420	9 969	9·01	9·405
Fixed carbon	71·341	81·236	79·265	83·691
Sulphur	·594	1·274	665	·909
Ash	8 975	6·545	9 915	5·345
	100·000	100 000	100·000	100·000
Color of ash.	Cream.	Reddish gray.	White.	Gray.
Fuel ratio	1 : 4 63	1 : 8·15	1 : 8·34	1 : 8·898

Specimen No. 1 is from what is known as Bed A, which underlies the working seam, and which is not mined. The coal from this bed, which occurs sixty feet below the bed that is mined, is true bituminous, while the coal from the working seam, and whose composition is shown in the analyses of specimens 2, 3, and 4, and in the table of Average Composition of Pennsylvania Anthracite, is a true anthracite, according to the trade classification, or a semi-anthracite by the classification referred to in the early part of this paper.

A study of the Bernice anthracite bed and of the underlying bituminous bed in conjunction with a consideration of the geological, physical, and chemical conditions under which the other Pennsylvania anthracites, the Welsh anthracite and the Belgian bituminous beds exist, would seem to lend support to the belief that the change of the original vegetable deposits into anthracite has probably been effected to a great extent through a chemical process, by which a portion of the carbon has been oxidized, forming carbonic acid, at the expense of the combined oxygen ; a portion of the combined hydrogen has been oxidized, forming water ; and a portion of the carbon and hydrogen have been combined, forming marsh-gas. The removal of the marsh-gas (carbureted hydrogen) in this way, as pointed out by Bischof, may convert bituminous coal into anthracite.

The heat, which was unquestionably produced in the main Pennsylvania anthracite fields, during the plication of the strata, has possibly helped the process, and the water, which was held by the strata in their semi-plastic condition at the end of the Carboniferous period when the

* These analyses are arranged in the order of the percentage of fixed carbon in the fuel constituents.

† Called red-ash bed in the Panther Creek Basin.

‡ This coal, according to the classification referred to below, would be called a semi-anthracite, on account of its percentages of volatile matter and fixed carbon. The percentage of volatile matter is not as great, however as that contained in many of the coals from the Shamokin and Lykens Valley districts, with which the Loyalsock coal favorably compares. The Shamokin and Lykens Valley coals are called anthracites by the trade, and on this basis the trade must consider Loyalsock or Bernice coal an anthracite.

plication took place, has probably been a potent aid.* The absence of great convolutions in the strata of the Bernice coal-basin would not necessarily invalidate this suggested explanation, since the time at which the Belgian field was plicated and the geological conditions under which it took place, may account for the coal-beds being bituminous rather than anthracite. The existence of two coal-beds, one bituminous and the other anthracite, in the Bernice basin, under the same geological conditions, might be accounted for more readily than the gradual transition of a bituminous bed into an anthracite bed in Wales.

The question has been asked, Why should the coal-beds of the Pennsylvania anthracite basins be more oxidized than those of the bituminous fields? In reply, Professor Lesley suggests this answer: "The undisturbed western coal measures consist largely of clay strata; those of the eastern coal measures consist in a much larger proportion of sand and gravel. This would favor the superior oxidation of the latter." Another important consideration is the fact that the circumstances subsequent to and during the time in which the vegetable matter that composed the anthracite beds was accumulated were probably more favorable to this oxidation. While the plication of the anthracite region would not seem to alone satisfactorily account for the origin of the anthracite character of the coals, yet the time and circumstances under which this plication took place were probably more favorable to the formation of anthracite in Pennsylvania than in Belgium.

THE DISTRIBUTION OF THE MANGANESE IN THE SPIEGEL FURNACE OF THE LEHIGH ZINC AND IRON COMPANY.

Written for the Engineering and Mining Journal by J. A. Jardine, E.M.

[The following interesting article on the special practice at the Bethlehem Works, at South Bethlehem, Pa., will be followed by an exhaustive article on the Manufacture of Spiegel from Franklinite residues. This subject has never before been fully presented, and Mr. George C. Stone, Engineer of the New Jersey Zinc and Iron Company, Newark, N. J., has prepared it with much care for this JOURNAL. The article will contain the fullest details of the manufacture, lives of furnaces, etc.]

In order that the results obtained may have their full practical value, it is necessary to give at least a short description of the plant, and to explain some of the conditions under which the spiegel is produced. I am under great obligations to Mr. J. Price Wetherill, General Manager, and Mr. G. C. Converse, Superintendent, for the kindness shown me when collecting the necessary data. The furnace is small, having a hight of 32 feet 6½ inches to the charging-floor, a diameter of 8 feet at the bosh, and a diameter of 4 feet 9 inches in the hearth. There are four tuyeres arranged at equal intervals around the hearth. The diameter of the nozzles is 3 inches, with the exception of the one in front, which is considerably smaller. A shell of one quarter-inch boiler iron extends around the furnace from the mantle to within 5 feet 9 inches of the top, and a water-coil surrounds the furnace at the bosh.

The pressure of the blast will average four pounds above atmospheric pressure, and its temperature as it enters the tuyeres ranges from 750 to 850 degrees Fahr. The spiegel is made from the residuum obtained in the treatment of a mixed ore from Franklin, New Jersey, for oxide of zinc. This ore, which occurs in veins in crystalline limestone, consists of an intimate mixture of Franklinite, zincite, and Willemite, together with a few other subordinate minerals. The residuum obtained from the furnaces employed to extract the zinc from the ore is a black cindery mass containing the iron and manganese of the Franklinite as a silicate and from 4 to 5 per cent of zinc.

A partial analysis of the residuum gives the following: Fe, 21·50 per cent; Mn, 8·71 per cent; SiO_2, 35·12 per cent. A charge for the furnace consists as follows: Residuum, 800 pounds; anthracite coal, 525 pounds; coke, 175 pounds; flux (CaO), 230 pounds.

The number of charges in a 12-hour daylight shift varies from 24 to 32. The night turn makes from 4 to 7 charges more than the day turn. The furnace is tapped for spiegel at intervals of six hours; for slag, about every hour. A system of condensers is employed to separate the flue-dust from the gases before they pass into the hot-blast oven and under the boilers. On account of the zinc remaining in the residuum, the flue-dust is mainly oxide of zinc, with some metallic zinc, and is termed blue powder. It is used in the manufacture of spelter. A slight modification of the hanging type of hot-blast stove is employed to heat the blast.

In order to learn the distribution of the manganese, samples of the residuum, slag, spiegel, and blue powder were collected during a period of forty-eight hours, while the furnace was working regularly, and an analysis made of each. In all cases, care was taken to obtain a fair average sample. The method of sampling was as follows:

As it takes about twelve hours for a charge to pass through the furnace, the sampling of the product was commenced that much later than that of the residuum. This was done so that the product to be sampled might be as nearly as possible a result of the reduction of the charges, of which a sample had already been taken.

The coal, coke, and lime being practically uniform in quality, a sample was taken directly from that in stock, without any reference to the charging. The sample of each consisted of pieces taken from different parts of the heaps. About one half shovelful of residuum was taken from each barrow as it was loaded for the charge during the forty-eight hours. A large quantity was thus accumulated, which was passed through a Blake crusher, to reduce the pieces to a uniform size. It was then sampled down to about one cubic foot of material by the use of a sampling shovel, and this amount crushed in an iron mortar to a still smaller size. This was again divided and the material reserved crushed to a size that would pass through an eighty-mesh sieve. It was then prepared in the usual manner for analysis. Samples of slag were taken from each flush and prepared for analysis in the manner described above, excepting that the slag, made during each twelve hours of the forty-eight, was kept separate. This gave four analyses of it, the average of them being taken in the subsequent calculations. A sample of spiegel was obtained by breaking a small piece from one of the pigs in each cast made during the period and the average of the analyses taken. The blue powder was taken from the condensers at the end of the time, and sampled by dividing and subdividing the mass until the proper quantity remained for the analysis.

After determining the percentage of manganese in the different samples, it became necessary to know the weights of the materials in the charge and of those in the product, relatively to some one of them, in order to determine its distribution. The basis of my calculations is one ton (2000 pounds) of spiegeleisen.

All weights excepting that of the slag were obtained at the furnace. The following are the direct weights:

The make of	Spiegel during the 48 hours	= 11·82 tons.
	Blue powder during the 48 hours	= 1·496 tons.
The weight of	Residuum charged during the 48 hours	= 46 tons.
	Fuel " " " " "	= 40·25 tons.
	Lime " " " " "	= 14·95 "

Hence, per ton of spiegel we have charged—

Residuum, 46 ÷ 11·82 = 3·89 tons.
Fuel, 40·25 ÷ 11·82 = 3·40 "
Lime, 14·95 ÷ 11·82 = 1·26 "

And have produced—

Blue powder, 1·496 ÷ 11·82 = ·126 ton.

It being impracticable to weigh the slag taken from the furnace during the period, its weight was determined in the following way:

All the silica (SiO_2) of the charge may be assumed, with considerable accuracy, to enter the slag, less that which enters into the composition of the spiegel as silicon and in the blue powder as a silicate.

From analysis, silica in	Residuum	= 32·12 per cent
	Flux	= 4·07 "
	Fuel	= 5·03 "
	Blue powder	= 7·38 "
	Slag	= 35·61 "
	Spiegel as silicon	= 2·47 "

Then we have, by the following equation:

$$\overbrace{3{\cdot}89 \times {\cdot}3212}^{\text{Residuum.}} + \overbrace{3{\cdot}40 \times {\cdot}0503}^{\text{Fuel.}} + \overbrace{1{\cdot}26 \times {\cdot}0407}^{\text{Flux.}} - \overbrace{1 \times {\cdot}0247}^{\text{Spiegel.}} - \overbrace{{\cdot}126 \times {\cdot}0738}^{\text{Blue Powder.}} = 1{\cdot}438$$

the weight of silica entering the slag produced, per ton of spiegeleisen. Now the slag contains 35·61 per cent of silica. Then the ratio of the weight of silica (1·438 tons) to the percentage (·3561) in the slag will give the weight of slag per ton of spiegel, which is 4·04 tons.

From analysis, manganese in	Residuum	= 8·71 per cent
	Spiegel	= 14·57 "
	Blue powder	= 1·95 "
	Slag	= 4·41 "
Then, the weight of manganese in residuum, charged per ton of spiegel		= 3·89 × ·0871 = ·3388 ton.
The weight of manganese in blue powder produced per ton of spiegel		= ·126 × ·0195 = ·00246 "
The weight of manganese in slag produced per ton of spiegel		= 4·04 × ·0441 = ·1782 "
And the weight of manganese in one ton of spiegel.		= ·1457 "

The amount of manganese charged (·3388 ton) per ton of spiegel is distributed as follows:

·1457 ÷ ·3388 = 43·00	per cent, entering into the composition of the	Spiegel.
·1753 ÷ ·3388 = 52·58	" " " " "	Slag.
·00246 ÷ ·3388 = 00·72	" " " " "	Blue powder.
Total = 96·30		

This result leaves 3·7 per cent unaccounted for. But from the appearance of the escaping gases, it is fair to assume that some manganese is lost by oxidation.

In consideration of the material smelted for spiegel, the excellent work of this furnace is evidence of good management, and the superintendent, Mr. George C. Converse, is to be congratulated upon his success.

Armstrong and His Ordnance in Italy.—Sir William Armstrong has signed a contract with the Italian government, by which he obtains the concession of a large tract of land on the Bay of Naples, on which land he will erect a cannon foundry and extensive ship-yards.

Tall Chimneys.—The Mechernich Lead Mining Company completed last year a chimney-stack of the following leading dimensions: The hight is 134·6 meters (440 feet 6 inches). The foundation, dressed stone masonry, is 36 feet square and 11 feet 6 inches high. The base, a cube of 32 feet 9 inches, and the octagonal plinth of the shaft, are both built of annular kiln bricks. The circular shaft is formed of radial bricks. It is 24 feet 6 inches outside and 11 feet 6 inches inside diameter at the base. At the top, it is 11 feet 6 inches outside diameter and 9 feet 10 inches inside diameter. The Port Dundas (Glasgow) chimney is 488 feet from the foundation to the highest point of the lightning-conductor, or 468 feet from foundation to cope-stone.

A New Open-Hearth Furnace for Iron and Steel.—A furnace having not only a basic hearth and sides, but also a basic port and basic roof, has been patented by P. C. Gilchrist, of Westminster, England. These ports are lined with compressed and molded, calcined, shrunk, and fritted lime mixed with tar and afterward coked, and thereby rendered hard and black. Bricks formed in the above manner should be used within a fortnight after production. After the furnace is built, it is brought to a high heat, which sets the basic material and prevents it from crumbling. It is desirable, after having thus brought the furnace up to a very high temperature, to anneal it by letting the temperature fall. This process of annealing may sometimes be performed with advantage more than once.

Fuel Consumption in Rolling Wire Rods.—At the Bussery & Verdié Works, at Lorette, France, a Corliss engine built by Schneider & Co., of Creusot, has been driving a train for rolling steel wire rods for four years. Some time since, a series of tests was made, continuing over ten days, to ascertain the fuel economy of the engine. The latter has a 26·59-inch cylinder, a 49·2-inch stroke, and makes from 61 to 64 revolutions a minute. During the test, the billets were uniform in size, and the same size of rods was rolled. A series of diagrams taken with a Richards indicator showed that the cut-off varied from four hundredths to one tenth of the stroke. The indicated horse-power was 156; the consumption of water per ton per horse-power was 16·75; and the consumption of coal, which had 15 per cent of ash, 2·5 pounds per hour per horse-power.

* Daubrée has shown that a small amount of water, raised to a temperature of between 300 and 400 degrees C., will produce rock metamorphism.

THE UNITED STATES BESSEMER STEEL INDUSTRY—THIRTY-FOUR WORKS

For the purpose of showing the magnitude of this industry, the *Bulletin of the American Iron and Steel Association* has prepared the accompanying list of all the companies and firms that have been engaged in the manufacture of Bessemer steel in the United States, or are now erecting Bessemer steel-works. Several companies that have gone out of existence are included in this list, in order to present a complete historical statement of the growth of the industry. The names of these companies are printed in italics.

STANDARD BESSEMER PLANTS.

1. *Kelly Pneumatic Process Company, Wyandotte, Wayne County, Michigan*, One 2½-ton experimental converter. Made its first blow in the fall of 1864. Bought by Captain E. B. Ward in 1865, and abandoned in 1869. These experimental works were connected with an iron rolling-mill.

2. Troy Steel and Iron Company, Troy, New York. Experimental Bessemer plant established by Winslow, Griswold & Holley. One 2½-ton converter. Made its first blow February 15th, 1865. Now two 10-ton converters. Added to an iron rail mill.

3. Pennsylvania Steel-Works, Pennsylvania Steel Company, Steelton post-office, Dauphin County, Pa. Two 7-ton converters. Made their first blow in June, 1867. An entirely new works. Three 8-ton converters added in 1881.

4. *Freedom Iron and Steel-Works, Lewiston, Mifflin County, Pa.* Two 5-ton converters. Made their first blow May 1st, 1868. Added to the forge and blast-furnaces of the Freedom Iron Company. Failed in 1869, and Bessemer works dismantled; most of the machinery went to Joliet, Illinois.

5. Cleveland Rolling-Mill Company, Cleveland, Ohio. Two 6½-ton converters. Made their first blow October 15th, 1868. Now two 10-ton converters. Added to an iron rail mill.

6. Cambria Iron and Steel-Works, Cambria Iron Company, Johnstown, Pa. Two 6-ton converters. Made their first blow July 10th, 1871. Added to an iron rail mill.

7. Union Steel Company, Chicago, Illinois. Two 6-ton converters. Made its first blow July 26th, 1871. Added to an iron rail mill.

8. North Chicago Rolling-Mill Company, Chicago, Illinois. Two 6-ton converters. Made its first blow April 10th, 1872. Added to an iron rail mill. *See No.* 17.

9. Joliet Steel-Works, Joliet Steel Company, Joliet, Illinois. Two 8-ton converters. Made its first blow January 26th, 1873, and its first steel rail March 15th, 1873. An entirely new works.

10. Bethlehem Iron Company, Pethlehem, Pa. Two 7-ton converters. Made its first blow October 4th, 1873, and its first steel rail October 18th, 1873. Now four 7-ton converters. Added to an iron rail mill.

11. Edgar Thomson Steel-Works, Carnegie Brothers & Co., Limited, Bessemer Station, Braddock post-office, Alleghany County, Pa. Two 7-ton converters. Made their first blow August 25th, 1875, and their first steel rail September 1st, 1875. An entirely new works. Now three 10-ton converters.

12. Lackawanna Iron and Steel-Works, Lackawanna Iron and Coal Company, Scranton, Pa. Two 6 9/10-ton converters. Made their first blow October 23d, 1875, and their first steel rail December 29th, 1875. Added to an iron rail mill.

13. St. Louis Ore and Steel Company, Western Steel Company, lessees, St. Louis, Missouri. Two 7-ton converters. Made its first blow September 1st, 1876. Added to an iron rail mill.

14. Pittsburg Bessemer Steel Company, Limited, Homestead, Alleghany County, Pa. Two 4-ton converters. Made its first blow March 19th, 1881, and its first steel rail August 9th, 1881. An entirely new works.

15. Pittsburg Steel Casting Company, Pittsburg, Pa. One 5-ton converter. Made its first blow August 26th, 1881. Added to a crucible steel-works. Product, ingots for special purposes and steel castings; works not intended for the production of rails.

16. Colorado Coal and Iron Company, South Pueblo, Colorado. Two 5-ton converters. Made its first blow April 11th, 1882. An entirely new works.

17. North Chicago Rolling-Mill Company, South Chicago, Illinois. Three 10-ton converters. Made its first blow June 14th, 1882. An entirely new works. *See No.* 8.

18. Scranton Steel Company, Scranton, Pa. Two 4-ton converters. Made its first blow March 29th, 1883, and its first steel rail May 4th, 1883. An entirely new works.

19. Bellaire Nail-Works, Bellaire, Belmont County, Ohio. Two 4-ton converters. Made their first blow April 28th, 1884. Added to an iron rolling-mill. Product, ingots to be rolled into steel nail plate.

20. Worcester Steel-Works, Worcester, Mass. Two 4-ton converters. Made their first blow June 2d, 1884. Added to an iron rolling-mill.

21. Riverside Iron-Works, Wheeling, West Virginia. Two 5-ton converters. Made their first blow June 11th, 1884. Added to an iron rolling-mill. Product, ingots to be rolled into steel nail plate.

22. Otis Iron and Steel Company, Cleveland, Ohio. One 5-ton converter. Made its first blow August 5th, 1884. Added to an open-hearth steel-works. Product, steel for rolling directly into wire rods.

23. American Iron and Steel-Works, Jones & Laughlins, Limited, Pittsburg, Pa. Building a Bessemer steel plant as an addition to their iron rolling-mill, to contain two 7-ton converters. Expect to be in operation early in 1886. Product, ingots for all purposes.

24. Juniata Iron and Steel-Works, Shoenberger & Co., Pittsburg, Pa. Building one 7-ton Bessemer converter as an addition to their iron rolling mill and open-hearth steel-works. To be completed early in 1886, and its product to be used for nail plate, shapes, plates, sheets, and bars.

25. Wheeling Steel-Works, Wheeling, West Virginia. Building two 5-ton Bessemer converters. An entirely new plant. Expect to be in operation by March 1st, 1886. Product, ingots for rolling into nail plate.

26. Laughlin & Junction Steel Company, Mingo Junction, Jefferson County, Ohio. Two 5-ton Bessemer converters. Made its first blow February 3d, 1886. An entirely new plant. Product, ingots for rolling into nail plate, etc.

CLAPP-GRIFFITHS PLANTS.

27. Oliver Brothers & Phillips, Pittsburg, Pa. One 2-ton Clapp-Griffiths stationary converter. Made their first blow March 25th, 1884. Now, two 2-ton converters. Added to an iron rolling-mill. Product, ingots for special purposes, not including rails.

28. Birdsboro' Nail-Works, E. and G. Brooke Iron Company, Birdsboro', Berks County, Pa. One 1½-ton tilting converter. Made its first blow September 22d, 1885. A new steel plant in course of erection, described by Mr. James P. Witherow, as follows: "This plant will consist of two 3-ton converters, only one of which will be completed at present. It is now intended to be of the tipping type, having the Clapp-Griffiths movable bottom and slag-tapping holes. It can be worked either as a tipping or stationary converter. with all of the Clapp-Griffiths distinctive features and equipments." Added to an iron rolling-mill. Product, ingots for rolling into nail plate.

29. Port Henry Steel and Iron Company, Limited, Port Henry, New York. Building a Clapp-Griffiths plant, to contain two 3-ton converters. Expects to be in operation early in 1886. Added to a blast-furnace plant. Product, ingots for special purposes.

30. Glasgow Iron Company, Pottstown, Pa. Building two 3-ton Clapp-Griffiths converters. Expects to be in operation early in the spring of 1886. Added to an iron rolling-mill. Product, ingots for boiler and other plates, including nail plate, and sheets.

31. Pottsville Iron and Steel Company, Pottsville, Pa. Building a Clapp-Griffiths steel plant, as an addition to its iron rolling-mill, to contain two 3-ton converters. Expects to be in operation early in 1886. Product, ingots for structural steel.

32. McCormick & Co., Harrisburg, Pa. Building a Clapp-Griffiths steel plant, as an auxiliary to their iron rolling-mills, to contain one converter. Expect to be in operation early in 1886.

33. Lickdale Iron Company, Lebanon, Pa. Building an entirely new plant, to contain Clapp-Griffiths steel converters, and to make plates.

34. Western Nail Company, Belleville, St. Clair County, Illinois. Two 3-ton Clapp-Griffiths converters. Made its first blow January 21st, 1886. Added to an iron rolling-mill. Product, ingots for rolling into nail plate.

MISCELLANEOUS.

35. Trenton Iron Company, Trenton, New Jersey. One 2-ton Gordon converter, completed in January, 1886. Added to an iron rolling-mill. Product, ingots for wire rods and special purposes.

36. Pottstown Iron Company, Pottstown, Pa. Building a steel plant as an addition to its iron rolling-mill. Particulars not yet made public. Will make steel plates and nail-plate.

COMMENTS.

Bessemer steel by the original, or acid, process can now be manufactured in the United States, and has for several years been manufactured, without payment of royalty for the use of any patent whatever, all the essential patents having expired.

With reference to the Clapp-Griffiths plants now under construction, Mr. Witherow writes that all are to be supported by two 3-ton converters, provision being made for an additional converter where one is building. The 2-ton converters of Oliver Brothers & Phillips, he says, now average from 160 to 175 tons in twenty-four hours, and could work to over 200 tons, but they have to work under the disadvantage of having no blooming mill for their ingots.

There is not one basic Bessemer plant in the country, if we except the old Bessemer plant of the Pennsylvania Steel Company, which was operated experimentally for a short time on basic steel, with unsatisfactory economic results.

The Bessemer steel industry, it will be observed from the above list, is no longer confined to a few establishments located in three or four States. Twenty-four Bessemer steel-works now exist in no less than nine States, namely, Massachusetts, New York, New Jersey, Pennsylvania, Ohio, West Virginia, Illinois, Missouri, and Colorado, while 10 more works scattered over some of the States named are in course of erection, and fast nearing completion, with others still projected. Omitting the Pottstown Iron Company's plant, of which we have as yet no definite information, the completed and partly finished works contain converters as follows: Completed works—ten 10-ton, five 8-ton, ten 7-ton, six 6-ton, eight 5-ton, eight 4-ton, two 3-ton, three 2-ton, and one 1½-ton; partly finished works—three 7-ton, two 5-ton, and nine 3-ton. Total, 67 converters, of which 53 are completed and 14 partly finished.

Compressed Lime Cartridges.—These are now used in a good many collieries in England. The lime is in a caustic state, ground to a fine powder, and consolidated by a pressure of 40 tons into the form of cartridges 2½ inches in diameter, having a groove along the side. These are then packed in air-tight boxes, to protect them from the damp, and are sent to the mine. Shot-holes are drilled in the face of the coal, and an iron tube half an inch in diameter, having a small external channel or groove in the upper side, and provided also with perforations, is then inserted along the whole length of the bore-hole. This tube is inclosed in a bag of calico, covering the perforations and one end, and has a tap fitted on the other end. The cartridges are inserted and lightly rammed, after which a small force-pump is connnected with the tap, and a quantity of water equal in bulk to the quantity of lime used is forced in. The water being driven to the far end of the shot-tube through the tube, escapes along the groove and through the perforation and the calico, flowing toward the tamping into the lime, saturating the whole, and driving out the air before it. The tap is then closed, to prevent the escape of the steam generated by the action of the water on the lime, and the flexible pipe attached to the pump is disconnected. The action of the steam first takes place, cracking the coal away from the roof, and this is followed by the expansive force of the lime. There is no fire or flame, and the coal is got with a very low percentage of small.

MODERN AMERICAN METHODS OF COPPER SMELTING.*

By Edward D. Peters, Jr., M.E., M.D.

CHAPTER XII.

THE MAKING OF BLISTER COPPER.

A similar weight of white metal may require fifty hours, which is quite long enough for the safety of the furnace, though a much greater length of time often elapses without harm.

As will be readily seen, it is impossible to work off a charge of blue metal within the prescribed limit of time, while even white metal extends the period most unpleasantly. It is therefore much better with metal of low quality to divide the operation into two stages—producing, for example, pimple metal, or regule, the first time, and bringing it up to blister copper by a second step. In this way, full charges can be used without endangering the furnace, and many advantages are gained.

It is not well, however, to alternate the operations in the manner just suggested; but rather to keep the furnace on one grade of metal until a large amount is collected, and then take up the blister process and maintain it until all the concentrated metal is disposed of. In this way, the evil of attempting to make blister copper on a bottom saturated with poorer matte is avoided; and the exact amount of concentrated metal required for a full charge of blister can always be had.

The matter may be pushed a step farther, by using a separate furnace for each operation and positively interdicting the use of the blister furnace for any other purpose.

The operation of making blister copper is frequently executed by constantly maintaining the charge in a molten condition after it is once melted and never allowing it to chill or "set," as it is technically termed.

By pursuing the latter plan, however, the danger to the hearth in long campaigns is greatly lessened, as it thus has a slight opportunity to cool, while the process is certainly advanced in a remarkable degree by the alternate fusions and chillings.

The belief that the operation of tapping causes a great gain in the grade of the matte, expressed among the Welsh smelters by the vulgar saying that "two tappings is worth one blowing," is contradicted by the following experiments executed by the writer for the purpose of determing the truth or falsity of the common belief:

	Just before tapping, per cent.		After tapping, per cent.
No. 1 copper	53·6	No. 1 Copper	53·2
2 "	66·8	2 "	68·0
3 "	72·7	3 "	70·2
4 "	75·4	4 "	75·2
5 "	79·3	5 "	79·1
6 "	85·4	6 "	86·2
7 "	94·0	7 "	93·2
8 "	98·7	8 "	98·5
Average	625·9	Average	623·6

A few test assays that showed a remarkable variation one way or the other were discarded, and, as seen, the others actually show an average lower, rather than higher, grade of the metal after tapping, which is doubtless merely an accidental circumstance.

The exact grade at which the blister copper should be tapped is a matter of much importance, as both too high and too low a copper present physical qualities injurious to the requirements of the process.

Blister copper of just the right grade is highly "red-short;" that is, can be easily broken when red-hot. It is this quality that enables the furnace-man to break and separate his pigs of blister copper, which operation is rendered greatly more difficult by a very slight variation in percentage in either direction. The proper condition of the charge is easily made manifest to the experienced, by ocular inspection, and the writer has endeavored to fix the limits that bound the grade of copper possessing this important quality.

Foreign impurities exert so much influence in this direction as to render impossible any exact establishment of such boundaries; but numerous tests have fixed the most favorable grade between 96½ and 99 per cent.

An important precaution in the care of a blister furnace is the proper draining of the hearth and stopping of the tap-hole. Carelessness in this respect will permit a slight and unsuspected leakage during the entire period of blister making, culminating in a mass of metallic copper filling the entire tap-hole, and, as has occurred to the writer, requiring the combined efforts of the furnace *personnel* and blacksmith employés for twelve hours to remove it.

The charge being high blister, and just ready to tap, exerts a ruinous effect upon the furnace bottom during any such delay, and should be ladled out at once under similar circumstances.

The slag from the blister process, being very rich in oxide of copper, should be returned to some process where the product is of high grade, and not, as is often the case in this country, sent back to the ore smelting, where its copper contents are thrown back again to the condition of a base sulphide.

COPPER REFINING.

The only method of copper refining practiced in the United States, or, in fact, in the civilized world, is the ordinary Swansea process.†

The purity of our local ores and the simplicity of our trade requirements have prevented the development of those marked variations that characterize the English process, where "best selected," "tough cake," "founder's metal," and many other distinct varieties, are demanded and produced.

The great excellency of the Lake Superior copper, derived from pure metallic ores, has established a very high standard in our markets, and owing to the abundant supply of the same, manufacturers have not, until recently, found it necessary to study the behavior or familiarize themselves with the capabilities of other brands of copper for certain uses, but, feeling sure that, if they bought the best, they would be safe, have employed this unnecessarily superior metal for the manufacture of brass castings and many other purposes, where a poorer quality would have served equally well.

As the copper from the Vermont and Tennessee sulphides, as well as from most of the Arizona carbonates, has been of almost equal purity, no serious embarrassment has arisen from this very high average standard of quality; while the comparatively limited proportion of Montana copper that is refined at home is mixed with somewhat better grades of metal to produce the brand known as Baltimore copper, which is almost invariably of excellent quality.

The most impure domestic coppers are sufficiently argentiferous to repay a separate process by which the quality of the baser metal is improved with the extraction of the nobler—of late, largely by electrolytic means.

While the details of the refining process have been studied with great care by various authors—among whom our own Egleston is distinguished by the exactness and extent of his investigations—any practical description of the same, from the stand-point of the working refiner, is wanting. The following brief review is offered as a slight contribution in that direction.

The refining-furnace presents no peculiarities to distinguish it from the ordinary English reverberatory, except that it should be more strongly constructed; being provided with a massive front plate—below the skimming-door—as well as strong horizontal lateral braces to strengthen the hearth, which, in addition to the enormous expansive force caused by the high temperature, must also sustain the weight of from 10 to 15 tons of molten metal.

The ash-pit is very advantageously provided with iron doors, which may be closed during the ladling, to exclude all currents of air, while the flue is brought as far as possible over the skimming-door, in order that the air-current that enters therefrom may ascend at once without affecting the metallic bath.

The two bottoms are smelted in with unusual care, and the upper one thoroughly saturated with repeated small charges of metallic copper. This should be spread over the entire surface in the shape of granules, and should be rapidly fused until it is entirely liquid. At first, nearly all will be absorbed, but eventually, a larger and larger proportion will be regained, and thoroughly dipped from the ladling-hole at the close of each operation. A hearth of the ordinary size, 9½ by 14 feet, will absorb from 6000 to 18,000 pounds of copper during the "soaking" process, according to the quality of the sand and the temperature attained during the "smelting-in" of the bottom.

On no account should metal of poor quality be used for purposes of saturation. This is a fatal economy, as the grade of all copper refined in the furnace for many months will be affected thereby.

Even after the bottom is well saturated and has attained a considerable degree of firmness, the careful refiner will avoid any possible injury thereto from heavy masses of metal. It is not uncommon to charge pigs of blister copper weighing 1000 pounds or more, the sharp corners and edges of which are very liable to cause indentations and unevenness in the toughest bottom, which may serve as the starting-point for serious after-effects. All such injuries may be avoided by laying down a rough floor of old planks or similar material.

The fuel best suited to refining is a not too caking, bituminous coal with long flame. Sulphur-bearing coals should be avoided, as tending to alter the "pitch" of the metal at critical moments. Where such coal is expensive, a cheaper variety may be used for the earlier stages of the process.

No better fuel exists for refining than wood, as its freedom from sulphur and other impurities, together with its long, pure, non-reducing flame, peculiarly fit it for the purpose. It was used entirely at the Ore Knob Refining-Works with great satisfaction, and would be more frequently employed were it cheaply attainable at the great copper centers.

The capacity of a refining-furnace should be increased by deepening the hearth rather than enlarging its area, as the difficulty of retaining the copper in proper pitch is greatly hightened by increasing the surface area. Within certain limits, this may be effected by constructing a clay dam at the skimming-door; beyond this, the deepening must be effected by lowering the bottom, which, in any case, must pitch toward the ladle-hole from every point.

The size of the charge is limited rather by custom and the capacity of the attendants than by the size of the furnace, and has been greatly increased of late years.

During the writer's student years, a charge of 14,000 pounds was considered large, but the present English refiners average perhaps 18,000 pounds.

The Lake Superior refineries are charged with some 18,000 pounds of 80 per cent "mineral," producing over 14,000 pounds of pure copper. This may be regarded as an average quantity, but the Orford Company, ever foremost in increase of capacity, has found no difficulty in refining charges of even 30,000 pounds. The principal trouble with large charges is the tendency of the refined copper to get "out of pitch" when retained in a molten condition for so long a time that fresh coal must be several times thrown upon the grate. Another difficulty is the want of room between hearth and roof to accommodate such a weight of metal. The shape and irregularity of the pigs of blister copper, and the difficulty of accurately placing such awkward bodies in the desired position in a red-hot furnace, have also prevented the ordinary use of larger charges. This is remedied in the Lake furnaces by lessening the customary pitch of the roof from bridge to charging-door, and curving it down abruptly at the latter point.

Great care must be observed regarding the quality of all material allowed to enter the refining-furnace. It is not an apparatus for the concentration of matte, but simply to alter the shape of metal that is already nearly pure, and putting the finishing touches on it. Much of the pig-copper produced from blast-furnace work from both carbonate and sulphide ores may advantageously undergo a preliminary purifying process in the blister furnace. All copper below 96 per cent should be thus treated; a mere melting-down with free admission of air being sufficient to produce a 99 per cent blister copper in most cases, so that two charges of 16,000 pounds each can be thus treated in twenty-four hours.

A few hundred pounds of the richest refinery slag from the last skim-

* Copy-right 1885, by the Scientific Publishing Company.

† A few unimportant exceptions to this statement may still exist.

ming may be returned to the same operation, the rest going back to the last preceding operation.

Cement copper from wet processes should, in most cases, be treated in the blister furnace It must be thoroughly dampened to prevent mechanical loss, and when mixed with white metal to the extent of one fourth or one third of the entire charge, assists so materially in enriching the product,and in shortening the operation, that it just about repays the cost of its treatment.

Mr. James Douglas, Jr., has regularly produced such pure cement, from both the old and new Hunt & Douglas process, that it is refined at once with advantage. The principal drawback is its excessive bulk, which renders it necessary to add the cement in several successive portions to obtain a full charge. This may be obviated by pressing it into bricks while yet damp.

But one charge can be treated in a refining-furnace each twenty-four hours, and in ordinary cases, the labor connected therewith consists of one head refiner, three or four ladlers (according to whether the refiner acts also as ladler), one night refiner, one man to lift the ingots from the boshes, one to dump the molds, and one to remove any accidental impurities from the ladles, dry the molds, etc. (The latter three operations are often conducted by boys.)* One man is also required to remove the ingots to the packing-house, while the packing itself, and the transportation and manipulation of the new charge, are effected by the furnace *personnel*, who usually expect to conclude the day's labor by three P.M. The work is very hot and severe while it lasts, and in the cases of the large charges referred to, may require extra assistance for packing the copper and similar extraneous work.

While the quality of the copper depends largely upon the skill of the refiner, its external appearance and neatness are principally influenced by the ladlers. As these latter qualities exercise an undue influence upon the sale of copper in this country, it is of great importance to create a body of trained and skillful workmen, whose pride, as well as self-interest, is enlisted in the matter.

The color of the copper has an influence with American buyers entirely disproportionate to its importance as a sign of purity. A deep rose-red is the color most prized, while any brassy appearance is very damaging in the eye of the buyer.

As this dirty yellow appearance can be produced at pleasure by allowing the copper to remain a few seconds too long in the molds before it is dumped into water, while the poorest copper may be colored a fine, deep red by lifting it out of the water for a second immediately after dumping, and then returning it again to the trough, as well as by the use of innumerable baths or "pickles," it certainly should not be regarded as of such vital importance. It is true, nevertheless, that *pure* coppers take on the desired color with much greater ease than those containing arsenic, antimony, or various other substances, and in the case of the remarkably pure Lake Superior metal, it is very difficult to produce that dreaded brassy appearance, which any impurity of water or want of care is certain to develop in ordinary cases.

The red color is produced by the formation of a minute film of suboxide of copper; but why this hue should be affected by slightly brackish water, or by changes of temperature in the cooling water, is difficult to understand. Pure water should be used and the most favorable temperature discovered for each variety of copper. In some cases, it must be nearly boiling; in others, stone-cold; while in still other instances, the refiner corrects an unfavorable coloring by the introduction into the cooling-boshes of soda-ash, salt, saw-dust, coal ashes, and various other apparently inactive substances.

The refining-furnace usually receives its fresh charge immediately after it has been emptied of the preceding one, say at three P.M. The fire is not urged until evening, in order that the first two stages of the operation, the *fusion* and the *fining*, may not be completed before the day shift comes on to execute the *refining* proper—the third and final stage.

With pig-copper of reasonably good quality, the process of fusion may be begun at seven or eight P.M., and be pushed as rapidly as possible. Owing to the high heat-conducting quality of this metal, the pigs retain their shape until the fusing-point is reached, when they soften and melt almost instantaneously. From the reducing character of the flame, only slight chemical changes have thus far been produced; but as soon as the protecting layer of slag is removed from the surface of the bath and air freely admitted, the process of purification proceeds with great rapidity, both from the direct oxidation of the foreign substances present as well as by the more far-reaching and powerful reaction of oxide of copper upon all those metalloids and bases that have a greater affinity for oxidation than the copper itself. A thin slag forms rapidly upon the surface, and is removed at intervals of an hour or so. The constant escape of anhydrous, sulphuric acid causes a persistent ebullition, which tends greatly to facilitate the process of oxidation. As the proportion of base metals becomes diminished, the slag is more strongly colored with the red oxide of copper, until that produced toward the close of this stage contains from 40 to 70 per cent of this metal, and becomes a valuable oxidizing flux for the preceding blister process. The total amount of slag produced during the operation of refining depends principally upon the quality of the pig-copper, but is seldom less than 12 per cent of the entire charge, containing from 4 to 6 per cent of the total weight of copper.

(TO BE CONTINUED.)

Beautiful Marbles in Algiers.—The rediscovery of the ancient quarries where the beautiful antique marbles were obtained is interesting. An extensive quarry, covering two thousand acres, has been quite recently discovered in the province of Oran, near the Mediterranean coast, in Algiers. The deposit has been obtained by an Italian who has constructed roads and begun operations. The deposit contains giallo antico, breccia, and cipoline, besides black and white marble. These fine colored stones can be laid on the wharf at Oran for about one dollar a cubic foot. The beautiful yellow marble, giallo antico, has, until this late rediscovery, been unknown, save by the fragments found in Roman ruins two or three years ago.

* The cost of refining can be easily estimated from the statements given.

Philadelphia Gas-Works Suit.—The trial of the city of Philadelphia's suit against Thomas R. Brown, ex-chief engineer of the gas-works, to recover with interest the excess over market prices that he paid for supplies furnished the Gas Trust between 1874 and 1879, ended on the 24th inst., the jury rendering a verdict in favor of the city for the full amount of the claim, $47,874.94.

Fossil Human Footprints.—Herr H. E. Low has obtained and forwarded to the Imperial Museum in Vienna twelve large stone slabs bearing the foot-prints discovered last year in the solid rock in the quarry over Lake Managua, in the territory of Nicaragua. The interest was increased by the statement that those foot-prints had been overlain by eleven different layers of stone, extending to a depth of four meters, and indicating an antiquity for our race quite transcending all conjectures hitherto hazarded. They are about three quarters of a meter square. They can now be inspected by European geologists. The foot-prints are sunk into the stone to a depth of from eight to ten centimeters. The stone itself is a porous volcanic tufa, and the superincumbent layers, which had been removed for building purposes, were all of a more or less solid volcanic conglomerate. The foot-prints are very conspicuous, and seem to be those of three distinct persons, one of whom was a child.

The Settle Water Cartridge for Fiery Coal Mines.—Our English exchanges tell us that "the experiments with the water cartridge—a patent safety appliance for blasting in mines—conducted in North Staffordshire were continued last week, the invention being put to severe tests in one of the most gaseous coal-seams of the district. The inventor is Mr. Miles Settle, managing director of the Madeley Coal and Iron Company, and the design of his invention is to inclose the explosive substance in an outer casing, either of metal, mackintosh, or oiled paper, which is then filled with water. The cartridge used in these experiments was the new compound of the Nobel's Explosives Company—gelatine-dynamite—and by a simple contrivance it was kept in such a position in the outer casing as to be completely surrounded by water. When the charge is exploded, which is done by electricity, the flame is instantaneously extinguished, and all danger of gas or coal-dust being ignited is thus avoided. Besides the absolute safety of the water cartridge, which, of course, is the point of paramount importance, it is claimed for it that the action of the water is such as to spread the explosive force, thereby increasing its effectiveness, so that it brings down or loosens the coal with but a trifling amount of slack. This, of course, is an important matter in a pecuniary sense to both employer and workman." [It appears to us that the action of the water in cooling the gases from the explosion must greatly reduce the efficiency of the explosive, though it probably reduces the danger of blasting in a fiery mine.—EDITOR ENGINEERING AND MINING JOURNAL.

Gold and Silver in Russia.—The Czar has approved some important changes in the monetary regulations of Russia. Up to December 29th, 1885, when the changes took place, the gold coin—imperials and half-imperials—in Russia, like that in England and Portugal, was $\frac{88}{96}$, or 916·666 fine. The coin of that standard, which is rather indefinite, being too soft, and therefore liable to a considerable loss of metal, the Russian government has decided to assume the standard used in most of the civilized countries, the United States included, that is, $\frac{900}{1000}$ fine. Silver roubles used to be of the standard, which was also indefinite, namely, 868·055; now they will be of the same fineness as the gold coin, $\frac{900}{1000}$. The legal deviation from the standard henceforth will be 0·001 for gold coin and 0·002 for silver roubles. A half-imperial will now contain 130·68 dolia of pure gold (there are 9216 dolia in a Russian pound); in other words, it will contain a little more of pure gold than that contained in a 20-franc gold piece. On that account, the Russian government believes that henceforth Russian half-imperials may circulate abroad at par with 20-franc gold coin, and thus the recoining of the half-imperials be prevented. The Russian mint (at St. Petersburg) issues annually about 25,000,000 roubles in half-imperial coins, about 500,000 roubles in silver roubles, and about 1,500,000 roubles in silver change. Gold mines in Russia yield annually about 100,000 pounds. The annual yield of silver is but a quarter of that of gold. Since 1868 to 1883, that is, for fifteen years, the total yield of gold in Russia was 1,138,487 American pounds. Of that amount, 1,033,183 pounds have been coined into money, and the rest was used for medals and decorations (about 3420 pounds) and bullion for the treasury and the owners of gold mines. All of the latter are bound to furnish their gold to the treasury, for which they receive in return gold coins and standard bullions, minus the expenses.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

GRANTED FEBRUARY 16TH, 1886.

336,099. Stone-Sawing Machine. John H. Frenier, Rutland, Vt.
336,187. Well-Drill. Willet C. Wells, Tiffin, Ohio.
336,199. Means for Collecting Waste Gas from Leaks at the Joints of Gas Conduits. Lemuel Bannister, Philadelphia, Pa.
336,226. Apparatus for Clarifying Molten Metal. Andrew C. Hogen, Cleveland, Ohio.
336,271. Screen for Coal and other Materials. Samuel T. Varian, East Orange, New Jersey.
336,272. Roll for Rerolling Old Rails. Edwin D. Wassell, Pittsburg, Pa., Assignor to Ann Isabella Wassell, same place.
336,317. Process or Method of Operating Gas-Wells. Peter M. Hitchcock, Cleveland, Ohio.
336,353. Well-Drilling Machine. Oscar Rust, Ithaca, New York.
336,397. Bushing for Rock-Drill Chucks. James E. Deaton, Hoboken, New Jersey.
336,401. Steam Rock-Drill. Henry Fischer, New York City.
336,403. Machine for Boring Wells. Norman B. Garrigues and Samuel Davis, Salem, Ohio.
336,439. Method of Treating Metals. Edward Samuel, Philadelphia, Pa.
336,470. Ratchet-Drill. Charles L. Breniser, Johnstown, Pa.
336,485. Gas-Heating Furnace. Robert W. Kennedy, Pittsburg, Pa., Assignor to Jones & Laughlins, Limited.
336,505. Gas-Engine. James Atkinson, Hampstead, County of Middlesex, England.
336,507. Ore-Separator. Francis R. Brown, Boulder, Colo.
336,537. Fan-Blast Regulator. John J. Wilson, Green Precinct, Assignor of one half to Henry H. Wilson, Lincoln, Neb.

REISSUE.

10,689. Apparatus for Distilling Turpentine and for the Purification of the Crude Products of Distillation thereof. James D. Stanley, Wilmington, N. C.

FURNACE, MILL, AND FACTORY.

Decisive action looking to the settlement of the affairs of Brown, Bonnell & Co. has been taken by Judge Baxter, at Cleveland, in ordering the sale of their immense plant at Youngstown, Ohio. The firm became involved in financial difficulties, and its business was placed in the hands of a receiver three years ago. It has since then figured in the United States Circuit Court. It is stated that the claims of the creditors aggregate over $1,000,000.

The Commissioners of Public Buildings at Philadelphia, Pa., will receive proposals until March 2d for all the bricks, cement, wrought-iron clamps, and coal required during the present year. Also for the granite curbing, rolled beams and girders for floors of clock tower, and for all the wrought, rolled, and cast-iron, brass work, glass tiling, and granite corbels required for the roof of the boiler-room for the heating and ventilating apparatus.

The old Omaha Iron-Works, Omaha, Neb., have been reorganized and will hereafter be known as the Paxton and Vierling Iron-Works. The works will at once enlarge their facilities for manufacturing all kinds of architectural iron work, vault, sidewalk, and platform lights, and sewers. The manufacture of steam-engines will be a specialty. Aside from this, they will manufacture boilers, hoisting and mining machinery, hand, steam, and grain elevators, brass work, shafting, pulleys, etc.

The Birmingham Rolling-Mill Company, Birmingham, Ala., has the large mill on in all departments. It has purchased the forge department of the Jefferson rolling-mill at Steubenville, Ohio, and will add twenty puddling-furnaces to the twenty-five now in blast. All the blast-furnaces are doing well.

The new Co-operative Nail-Works Company, Steubenville, Ohio, has begun operations.

The Williamson Iron Company, Birmingham, Ala., is rapidly pushing forward the construction of the new blast-furnace, having the casting-house and the foundations for its engines and the stack completed.

Proposals will be received until March 8th by John K. Cresswell, City Engineer, Kankakee, Ill., for constructing, operating, and maintaining water-works for Kankakee, Ill. There will be required from ten to eleven miles of pipes, about 100 hydrants, a full double set of pumping machinery (capacity of each 2,000,000 gallons per twenty-four hours), and a reservoir of a capacity of 250,000 gallons.

The Brown Hoisting and Conveying Machine Company, Cleveland, Ohio, has adapted its system for use in excavating for sewers, etc. A plant of this kind has been completed, and will soon be put to practical test on sewer work at Akron, Ohio. Mr. Alexander E. Brown has succeeded in perfecting a curved bridge tramway with adjustable piers, thus enabling the Brown machine to convey material and deposit its load on a line parallel with that of the vessel or car unloading. Mr. Brown has also perfected a continuous cable tramway for conveying material long distances over uneven surfaces. The New York, Pennsylvania & Ohio Railroad Company has ordered another hoisting and conveying plant for its dock in Cleveland, making the fourth Brown plant purchased by that company.

Proposals will be received until March 1st at the United States Navy Pay-Office, No. 27 State street, New York City, for the following supplies, of best quality: Iron, hose, oils, copper, tin, pipe and fittings, brass and copper tubes, files, bolts and nuts, brushes, coal, steel, packing, hardware, brick, lime, belting, steam traps, fire-brick, and tools. Each schedule must be bid for separately.

The Volta Iron Company, Limited, is pushing the work of erection on a ten-ton open-hearth furnace at Apollo, Pa. The Pittsburg Galvanizing Works have been consolidated with this company. This new departure of the Volta Company has been the cause of the erection of a new sheet-mill at Leechburg.

The sheet-mill of the Bay State Iron Company, at Boston, recently purchased by Messrs. Jennings, Beale & Co., of Leechburg, Pa., will be removed to Leechburg and be in operation by the 1st of July.

Messrs. Jones & Laughlins, of the American Iron-Works, Pittsburg, Pa., who, as we have stated before, are adding a Bessemer and an open-hearth plant to their works, are now considering the question of erecting a blast-furnace.

The Water-Works Company, of San Diego, Cal., has contracted with the Holly Manufacturing Company, of Lockport, New York, for a Gaskill compound condensing pumping-engine of two million gallons daily capacity, which is to pump water alternately into two distributing reservoirs at elevations of 145 and 300 feet respectively, forming a high and low service. The engine is guaranteed, when pumping into the lower reservoir, to show a duty of 85,000,000 foot-pounds, and when pumping into the high service reservoir, a duty of 70,000,000 foot-pounds per 100 pounds of coal. The price is given as $10,000.

After about eight years of litigation, the suit of the New England Iron Company against the Gilbert (now Metropolitan) Elevated Railroad Company of this city, which has been pending in the Superior Court of New York City, has been settled upon the payment by the Elevated Railroad Company of $250,000 to the iron company.

Proposals will be received by the trustees of the water-works at Anderson, Ind., until March 4th, for furnishing approximately 200 tons of cast-iron water-pipe of diameter from 16 to 6 inches inclusive; also the laying of said pipe; the furnishing of 7 tons of special castings; one 16-inch valve, one 12-inch valve, one 10-inch valve, one 8-inch valve, and seven 6-inch valves; 20 fire-hydrants; one pump-well, including river connection; 2 pumping-engines, each with capacity to pump 1,000,000 gallons of water per twenty-four hours; two return tubular boilers, each 4 feet in diameter and 12 feet long, including engine foundations and boiler setting.

Messrs. Rogers, Brown & Co., pig-iron and iron ore commission merchants, of Chicago and Cincinnati, have opened a branch house in St. Louis, of which Mr. W. H. Shields has been made manager.

Proposals will be received by S. McDowall, Mayor of Beatrice, Neb., until March 10th, for furnishing 750 tons of cast-iron water pipe (calamine and wrought-iron pipe may perhaps be considered); 20 tons of special castings; the laying of said pipe; furnishing 60 fire-hydrants; one 16-inch valve; one 12-inch valve; three 10-inch valves; five 8-inch valves; ten 6-inch valves; ten 4-inch valves; two pumping-engines, each with capacity to pump 1,500,000 gallons per twenty-four hours; two return tubular boilers approximately 4½ feet in diameter and 15 feet long, including the engine foundation, boiler settings, and fixtures; one supply-well, approximately 30 feet diameter and 25 feet deep, including connection with Big Blue River, the proposed auxiliary source of supply.

Messrs. James Simpson & Co., Limited, of London, England, have concluded an agreement with the Worthington Pumping-Engine Company, London, and Henry R. Worthington, of New York, for the exclusive right to manufacture Worthington pumping-engines.

Proposals will be received until March 3d by Rufus Saxton, Assistant Quartermaster-General, U.S.A., Jeffersonville, Ind., for furnishing 100,000 gallons of mineral oil.

The Roller Chain Belting Company, of Columbus, Ohio, manufacturer of detachable chain belting, elevators, etc., reports a good business. It has been running its works full-time the past winter, and the present outlook is very encouraging.

The judicial sale of John W. Mumper's interest and undivided half in the Barre forge and furnace property in Huntingdon County, Pa., to Mrs. Mary A. Mumper, as mentioned in our last issue, has been confirmed by the court, and the proceeds paid over to the sheriff for the benefit of the creditors. Mrs. Mumper is a judgment creditor, and claims all of the fund arising from the sale. Other creditors allege that her judgments are fraudulent, and will probably contest them in court.

LABOR AND WAGES.

After eight months and a half of the stubbornly contested strike of nailers, heaters, and rollers employed in the mills represented in the Western Nail Association, the first break was made on the 19th inst. by the Junction Iron Company, Wheeling, West Va., whose mill is located at Mingo, Ohio, signing a compromise scale of wages, 20 cents a keg for cutting nails at the present selling card of $2.50 for ten-penny nails, and proportionately less for larger and more for smaller sized nails; the scale to ascend one cent a keg with every advance of 25 cents in selling price, and descend one cent with every 25 cents reduction until prices reach 18 cents, below which no reduction is made in wages. The Junction Iron Company has been expelled, in consequence of this movement, from the Western Nail Association, which has resolved to reaffirm the pledges to adhere to the manufacturers' scale, and authorized the conference committee to confer with a committee of the strikers on all questions except the position of the present workmen in the mills, which shall remain undisturbed.

At a convention of coal miners in Cumberland, Md., an advance of ten cents a ton was demanded for the districts represented, to go into effect March 8th. They state that at present rates miners are unable to earn a living for their families. The operators are requested to meet the executive committee appointed by the convention on March 1st, to discuss the question of an advance, and, if possible, to avoid a strike.

The employés of the Chesnut Hill Iron Company's furnaces, near Columbia, Pa., have been notified of an increase in their wages to the scale before the reduction in January.

A joint convention of coal miners and operators of coal-producing States convened at Columbus, Ohio, on the 23d inst., with representatives present from Ohio, Indiana, Illinois, Pennsylvania, and West Virginia. The principal object of the convention was the adoption of a schedule of rates for mining the coming year, beginning May 1st, in the districts of the States represented. The following is the revised scale of rates adopted to go into effect May 1st: Pittsburg, 71 cents a ton; Hocking Valley, 60 cents; Indiana block, 80; Indiana bituminous No. 1, 65; Indiana bituminous No. 2, 75; Wilmington, Ill., 95; Streator, 80; Grape Creek, 75; Des Moines, Iowa, 90. West Virginia, the Kanawha District reduced prices to be restored to 75 cents; Reynoldsville, Fairmount screen coal, 71 cents. The convention will meet at Columbus the second Tuesday in February next year.

Notices are posted in the several mines operated by the Scullin Coal and Mining Company, at Richmond and Camden, Mo., to the effect that on and after the 1st of March the pay for mining coal will be reduced from 4 cents to 3½ cents a bushel. The miners as yet have taken no definite action in the matter, but it is understood that the rates will not be accepted.

The coal miners have resumed work in the mines at Mattoon, Ill., under the same conditions prevailing before the strike was made.

The coal miners of the Kanawha and New River District, at a meeting in Coalburg, West Va., on the 24th inst., resolved to ask the Legislature to enact a law to pay the wages of workers every two weeks, and to make a day's work eight hours; and that the miners' convention that met at Columbus, Ohio, instruct all dealers that they will be boycotted if they handle coal from operators who pay miners 2½ cents a bushel or less for mining. It was also decided to put local organizers in the field to perfect the organization.

The coal miners of the Cliff mines, at Emporia, Pa., on the 24th inst. demanded an advance of 10 per cent in wages, to begin March 1st.

The wages of the employés of the R. W. Coleman heirs, the Robesonia Iron Company and the north Cornwall Furnaces, Lebanon, Pa., all under the same management, have been advanced 10 per cent.

The strike in the coke regions of Pennsylvania is virtually over. The operators' and miners' representatives had a conference at Scottdale on the 20th inst., and the result was a concession to the miners of ten per cent advance. Work was resumed on the 22d inst. The strike lasted five weeks, with an estimated loss to operators and strikers of over $500,000. All the English-speaking miners resumed, and some of the Hungarians, upon the condition that their countrymen were to be released from jail. There are a great many people who prophesy another strike within the coming three months. The strikers have been successful for the first time in their history, and there are unmistakable evidences that the men already contemplate asking for other advantages than those embraced in the agreement. The next move, it is said, will be against the company's stores and in favor of a check-weighman.

A dispatch dated the 25th states that dissatisfied Slavs caused more trouble in the coke regions this morning. A crowd of them assembled at Broadford and marched to the Summit, on the Mount Pleasant branch, forcing every coke drawer from work along their route. They were nearly all armed, and fired numerous shots in order to intimidate the workers. The strikers demand an advance of 10 cents per oven, instead of 10 per cent, recently granted. At Leisen-

ring, the men requested Superintendent Taggart to discharge a man who had worked during the strike. This was refused, and the men all struck this morning.

TRANSPORTATION NOTES.

The Milwaukee, Lake Shore & Western Railroad Company has at last decided to build its large merchandise and coal dock in Ashland, Wis., and work will soon begin. It is said that the dock, when completed, will be the largest one on Ashland Bay.

The Baltimore & Ohio Railroad Company will be running its line to Philadelphia by July 1st, and will make the connection with the Philadelphia & Reading tracks in that city by October 1st. Now that the ice is out of the Susquehanna River, work on the big bridge at that point will be pushed actively. There will be forty-five stations on the line of the road.

The annual meeting of the Delaware, Lackawanna & Western Railroad Company this week resulted in the re-election without opposition of the former officers and directors. The management remains as follows: Samuel Sloan, President; Frederick F. Chambers, Secretary; Frederick H. Gibbens, Treasurer.

COAL TRADE NOTES.

ILLINOIS.

A license has been issued to the Charleston Mining and Coal Company, at Charleston, to carry on a general mining business; capital stock, $15,000.

IOWA.

The coal shipments from Oskaloosa are quite up to the average. The threatened action by the Iowa Legislature now in session regarding coal screens caused a feeling of nervousness. The proposed new method of weighing coal would force a heavy cut in the present price paid miners to maintain the present gross cost of producing a ton of clean coal. A general strike would inevitably follow, causing a loss to the business community of the amount of the pay-roll, which is about $5000 a day.

MONTANA.

Col. C. A. Broadwater has purchased for himself and associates coal lands of the government in the Sand Coulee District. The tract comprises 1300 acres, and was paid for in cash at $10 an acre.

PENNSYLVANIA.

ANTHRACITE.

An order was issued on the 20th inst. by the Cross Creek Coal Company to suspend work at the Tomhicken collieries.

In the preparation of 643,990 tons of coal for market in January, according to the Inspector's report, eight persons were killed and twenty severely injured in the Pottsville, Shenandoah, and Shamokin districts; 35,353 persons were employed.

The work of removing the *débris* that entombed the twenty-six miners at Slope No. 1, of the Susquehanna Coal Company at Nanticoke, has proceeded far enough to show that the men were not crushed by the falling mass. They must have retreated to the higher workings and been slowly starved to death. The danger of pursuing the search is so great that the work will probably be abandoned.

The Derringer-Coxe suit, to which we have referred in previous issues, and which involves the ownership of coal lands valued at over $1,000,000, was begun in court at Wilkes-Barre on the 24th inst. Ex-Judge Amos Briggs, of Philadelphia, and Clarence M. Derringer appeared for the plaintiff, and Franklin B. Gowen and A. H. McClintock for the defendants. Clarence M. Derringer, opening the case, stated that this was an action in ejectment brought in 1872, by parties for the possession of a large tract of land in Sugarloaf township, Luzerne County. He then gave a history of the title to the land since 1793. The whole of the day's session after the opening address was occupied in reading the records of the county establishing the title of the defendants.

BITUMINOUS.

A charter has been granted to the Clearfield Consolidated Coal Company, of Philadelphia, with $100,000 capital; directors, Charles S. Henchman, Jeremiah R. Levan, William P. Davis, Henry W. Lambierth, of Philadelphia; John Langdon, of Huntingdon.

WYOMING.

The Legislature has under consideration a bill for the protection of coal mines, by requiring the owners of mines to properly ventilate and timber under the supervision of a territorial mine inspector.

A fire-damp explosion is reported to have occurred in No. 3 coal mine at Almy, at noon on the 21st inst. Fifteen men were burned, but nobody was killed.

GAS AND OIL NOTES.

Exports of refined, crude, and naphtha from the following ports, from January 1st to February 20th:

	1886. Gallons.	1885. Gallons.
From Boston	375,893	995,142
Philadelphia	13,433,360	8,702,720
Baltimore	1,662,712	1,188,480
Perth Amboy	350,944	
New York	52,469,046	47,020,387
Total exports	68,291,955	57,906,729

NEW YORK.

A correspondent of the *Tribune* states that the first natural gas well was bored in 1821, by a man named Hart, at Fredonia, at the crossing of Main street and Canadaway Creek. The well was one and a half inches in diameter, was twenty-seven feet deep, and yielded enough gas to use in thirty burners. Natural gas has been used there ever since.

OHIO.

It is stated that Pittsburg capitalists have leased territory near Cincinnati for the purpose of testing it for natural gas. The parties have made contracts with a number of manufacturing firms there to supply them with gas for five or ten years. These contracts lose their validity if the gas is not supplied within two years.

Natural gas is reported to have been struck at Finlay at a depth of 1125 feet. It is the largest well yet struck except the Karg well. This is the fourteenth well that has been sunk in this locality, and only one has been a failure.

PENNSYLVANIA.

The Keystone Natural Gas Company of Pittsburg has been incorporated, with a capital stock of $300,000. It is intended to begin work at once to lay a ten-inch main from Murraysville to Pittsburg. The wells that will furnish the gas have already been developed near Murraysville. As soon as the pipes are laid, gas will be supplied to the Carnegie Works, both at Bessemer and Homestead, and to their extensive works on the Allegheny River front.

The feeling in regard to the stock of the Philadelphia (Natural Gas) Company is very strong, and sales have been made at $60.

The annual meeting of the Tuna Oil Company was held in Pittsburg last week. The reports show the company's condition is encouraging. After declaring an extra dividend of 10 per cent, or $5 a share, on the capital stock of $110,000, there will still remain in the treasury a surplus of $15,000, while the yield of the company's oil territory is said to be greater than ever before. The old board of directors was re-elected, as follows: Finley Torrens, Joseph Vogel, George W. Cochran, William Guckert, and F. C. Osburn. Finley Torrens is President, and Captain G. W. Cochran Secretary and Treasurer.

Messrs. Andrew W. Mellon and J. M. Guffy, who own a large tract of gas territory convenient to Allegheny, have organized a company that will soon be able to supply the city with gas. Six months ago, wells were drilled and excellent strikes made. The wells were plugged and have so remained ever since. Their coming into Allegheny City will shut out the Ohio Valley Gas Company, which contemplated extending its lines up from Sewickley. It is thought that this competition will induce the Allegheny Heating Company to reduce its rates.

WEST VIRGINIA.

The Camden Consolidated Oil Company, Parkersburg, will, it is reported, erect 13 additional stills and a plant for manufacturing gasoline at a cost of about $25,000. The building of paraffine works is also contemplated.

The West Virginia Natural Gas Company will within six months complete a thirty-mile line of pipe to Wheeling, running from Washington County, Pa.

GENERAL MINING NEWS.

CALIFORNIA.

INYO COUNTY.

The furnace at Swansea turned out bullion valued at $32,400 from the smelting of 135 tons of ore.

KEYNOTE.—A strike has been made.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended the 15th inst.:

BULWER.—On the 8th inst., a cross-cut east was started on the 100-foot level, to cut the Ralston No. 1 ledge, and after cutting through the hanging-wall of the Homestake ledge, an entire change of ground was encountered, being soft bluish-white porphyry and clay, through which the cut has been driven 40 feet during the week. The ledge must have been thrown at this point, as they are now beyond where it should be. They will continue until they get the ledge, or at least a change of ground.

CONSOLIDATED PACIFIC.—The vein has increased slightly in size, but otherwise there is no material change to report.

STANDARD.—Ore-bodies continue without material change. Three hundred and fifty-two tons of ore were sent to the mill. The Standard side only of the Bulwer-Standard mill is now running. Bullion valued at $7813.95 was shipped on the 9th. Forty-seven men are employed.

COLORADO.

CHAFFEE COUNTY.

MARY MURPHY.—A rich vein has been struck on the seventh level. The vein is said to be eight feet wide. A new tram is building to the lower level.

CLEAR CREEK COUNTY.

BENTON.—It is stated that this mine, at North Empire, has been examined in the interest of some Eastern parties. They find and report over 35,000 tons of ore in sight, the average value of which is $16 per ton gold and some small values in silver. The main shaft is down 400 feet and a contract let to sink 100 feet more. The Benton ore has a value outside of the gold it contains for fluxing other ores, and is always wanted by the smelters.

CUSTER COUNTY.

BULL-DOMINGO.—According to *Mine, Stock, and Rail*, the claims for damages of the widows and orphans of the victims of the recent mine disaster have not yet been settled. The property, it is said, is now known as the Phœnix Mining Company. The new company is ignoring the claims entirely. It is thought that suits for damages will be commenced. The criminal suit against Foss, the superintendent, who caused the disaster by his negligence, will not benefit the claimants.

GILPIN COUNTY.

GUNNELL.—The company has completed sinking 100 feet in the Grand Army shaft, and has begun to drive its 900-foot east and west levels from the Grand Army shaft. Power-drills are used in executing the work.

HUBERT.—The company is working a force of 55 men, tribute work and day's pay. Development-work is carried to a greater depth, and sinking will be resumed early next month. Forty stamps are kept busy crushing ore—fifteen at the New York Mill in Black Hawk, and the full capacity of the Lewis & Aulsebrook mill in Nevadaville—25 stamps. The smelting ore is shipped to Denver.

RARA AVIS.—This company, whose property is located on Prosser Mountain, is timbering up the adit that strikes the main shaft on the Whitney mine 300 feet below the surface, which will be completed by April.

GUNNISON COUNTY.

An eighty-stamp mill is to be erected at Ohio City, near the Legal Tender mine.

LAKE COUNTY.

TWIN LAKES PLACER GOLD MINING COMPANY.—A correspondent has written us in regard to the following note, which appeared in our issue of the 13th inst.: "'Mr. Thomas Goad, on the 3d inst., won his suit in the United States District Court of Denver, against this company. Mr. Goad claimed a certain allotment of stock as compensation in assisting in the sale of the property to the English company, known as the Twin Lakes Hydraulic Gold Mining Syndicate, Limited. The judgment is equal to about $10,000.' Mr. Goad began his suit with an application for an injunction to restrain the Twin Lakes Placer Company from disposing of certain stock of the Twin Lakes Hydraulic Gold Mining Syndicate, which it owned. A

temporary *ex parte* injunction was granted and a date set for hearing (on the merits of the injunction). When that date arrived, the defendants allowed the injunction to become permanent, so that all the issues might be tried at one time, namely, when the case came up on its merits at the May term of the Federal Court in Denver. Thus the case now stands. No trial has taken place, and consequently no judgment has been given."

The Leadville *Herald* reports the following:

AGASSIZ.—January, the Wolfe Tone mine shipped to the smelters between 2000 and 2500 tons of ore, which averaged over eight ounces of silver and about 30 per cent in lead, or about $18 a ton above smelting charges.

BIG CHIEF.—The shaft is draining previous to the resumption of work.

CATALPA.—Reports show that the company about met its expenses last year, the output being entirely from the old workings. The company mined 2955 tons of iron ore, yielding $28,394.62 for the silver it contained. Owing to the depressed condition of the iron market, the results have not been as large as was expected. During the years 1883 and 1884, the company mined a large amount of iron ore, receiving $4 a ton for the iron in addition to the silver it contained. It is estimated by the superintendent that there are half a million tons of ore in the mine that could be extracted and brought to the surface at a very moderate expense, and would yield a handsome profit with an ordinary demand from iron manufacturers.

CLONTARF.—Sinking of the shaft in search of a lower contact has begun. The Clontarf shaft is but a short distance southeast of the Maid of Erin shaft.

ELIZA.—One of the most important disclosures of ore made in this district for a long time is the opening of the ore-body in this lode, on Breece Hill, which runs high in lead and well in silver, and also above the average in gold per ton.

EMMET.—The company leases Nos. 1, 3, and 4 are producing considerable fine ore, and opening up some promising territory. The section of ground known as block 2 is worked under the direction of Noah Gregg, the manager for the company. Sections 5 and 7 have just been leased to Mr. Robert B. Estey, who will begin sinking a new shaft at once.

LEADVILLE CONSOLIDATED.—The lessees on the southern portion of this property have attained a depth of 100 feet in their new shaft. They are also prosecuting exploration-work from the southern extension of the main workings of the Carbonate mine.

PITKIN COUNTY.

EMMA.—Trouble has again broken out between the owners of this mine. The mine has for some time been operated at a loss. It has been run under the management of the Aspen Mining and Smelting Company, which owns it all, except the interests held by A. W. and T. A. Rucker. The latter have been assessed, so they claim, to meet a deficit for some months past. They have notified the company that the mine will have to be under a new management or be thrown into the hands of a receiver.

VALEJO.—Judge Hallett denied a motion for a new trial in the case of Patrick *vs.* Wheeler for possession of a one-fourth interest in the Valejo mine at Aspen. The costs were also assessed against Patrick. Execution of judgment was stayed to await a bill of exceptions, which is to be filed by the first day of the next term.

SAN JUAN COUNTY.

ALEXANDRIA.—This company has been organized in New Orleans to work this mine, which shows a large body of carbonate and galena ore.

ASPEN.—The mine is in better shape than at any other period in its history, and has more ore in sight. The force at the mine numbers fifty men, most of whom are engaged in development-work.

SILVERTON MINING COMPANY.—It is reported that the Comstock Sampling and Concentrating Works have been sold to this company, which owns and operates the North Star mine on Sultan Mountain, and other valuable properties. This disposes of the adverse suits brought against Messrs. Hough & Comstock to prevent the issue of a patent to the Blanche placer claim, on which these works are located. These works have been idle for more than a year.

DAKOTA.

LAWRENCE COUNTY.

CALEDONIA.—The superintendent's report for the week ended 15th inst. shows ore produced from the 425-foot level, 1007 tons; cave, 432 tons; total, 1439 tons. The drift on the 300-foot level has advanced 19½ feet, making a total of 80 feet. The winze advanced 8¼ feet. Total, 46 feet. The south drift advanced 4 feet; total, 47 feet. Every thing is running along well at both mine and mill.

MEXICO.

The Mexican *Financier* reports the following:

Eduardo Mattern, of Tapachula, State of Chiapas, has denounced a gold and silver mine on the Tuliman River, which is said to promise well.

A vein of lead has been discovered and denounced by Feliciano Fruto and others on the lands of the Santa Aña hacienda.

Five leagues north of Culiacan, there has been discovered an iron mountain that is reported by the local press to be more easily worked than the celebrated Cerro de Mercado of Durango. There is abundant water and timber near at hand, and a number of ranches and important haciendas near by. Lime for smelting the iron is said to be in abundance. The iron mineral region near Culiacan has been visited by the Governor of the State, the assayer of the mint, and the chief-engineer of the Sinaloa & Durango Railroad.

The Fiera and Cobrisa mines, at Guadalupe, eighteen miles south of La Trinidad, Sonora, are opening and are showing up well. A few other of the great number of ancient mines of that locality are reopening.

ABUNDANCIA.—This mine, twelve miles west of La Trinidad, is still in bonanza. It is working 150 men, and expects to start up the new mill soon.

BLANCA.—This mine, at Pachuca, is doing well, and may pay a dividend soon.

MINAS VIEJAS.—These mines, at Villaldama, Nuevo Leon, are in bonanza.

MULATOS.—The 60-stamp mill is running to its full capacity on the gold ore of this mine.

OCULTA.—This group of mines, Sonora, is sending large quantities of high-grade ore to Nogales, Ariz., there to await the completion of the Nogales Smelting-Works.

PABELLON.—This mine, at Pachuca, belonging to the Maravillas Company, began sinking a shaft of ten varas recently, and has struck first-class ore.

SALERO.—A new mill is to be built at this mine in the southern foot-hills of the Santa Rita Mountains.

SANTA GERTRUDIS.—Shares are quoted at $400.

SILVER QUEEN UNITED.—The new machinery at the Animas mine, at San Javier, Sonora, is in place, the cages running, and the shaft has been newly and thoroughly timbered. The mill at Los Bronces, one mile from the mine, is about ready to start up for a steady run as soon as the mine begins shipping ore. Seventy tons of Animas ore, left over at the mill from the last run before the London Company purchased the property, were run through the mill and yielded $6000 in silver bullion, which was sent to Hermosillo for coinage.

MICHIGAN.

IRON MINES.

CLEVELAND IRON COMPANY.—The company is doing some exploring for hematite about a mile east of Ishpeming with encouraging results. A diamond drill was first used, and this was followed by a shaft. The ground being swampy, sinking was difficult, and some time was occupied in reaching the ore. From the shaft, a cut to the hanging, 15 feet in length, was made, and drifting has been prosecuted along the hanging for a distance of 50 feet. The ore, on the top of the vein, runs about 60 per cent in metallic iron.

IRON CLIFF.—This company is putting down a diamond drill-hole near the point where the Cleveland Iron Company, as stated above, is carrying on its exploration.

MASTODON.—Work is soon to be resumed at this mine, the task of unwatering it having been successfully accomplished.

MINNESOTA.

MINNESOTA IRON COMPANY.—It is reported that this company has contracted with Thomas Williams, owner of the Wilson line of boats, to carry its output next season at $1.35 a ton.

MONTANA.

BEAVER HEAD COUNTY.

KENT.—The first car-load of ore from this mine, Blue Wing District, was sold at Salt Lake City on the 15th inst. to the Hanauer Works. The ore assayed 107 ounces silver and 14 per cent lead. Regular shipments will continue to this market. This ore has heretofore been going to Omaha.

LEWIS & CLARKE COUNTY.

Our Helena correspondent writes that the stock market has been dull for the past month. There have been more sellers than buyers. Work is steadily progressing on all of the different mining enterprises in this vicinity. With the building of a railroad into the Red Mountain District, the coming season promises to be one of unprecedented activity and development. At the regular tri-weekly meeting of the Helena Mining and Stock Exchange, held on the 18th inst., no sales were made. The following are the quotations. One of the principal features of the evening was the offer of 30c. for 1000 shares of Consolidated Red Mountain, while 35c. was asked. This was a *bona-fide* bid. Sixty cents was bid for Cruse Mountain, 75c. for Helena Silver Mining Company, and 25c. for Rocky Mountain Tunnel and Mining Company.

SILVER BOW COUNTY.

LIQUIDATOR.—The company has sold to W. A. Clark all of the ore on the east 75 feet of its mine from the 300-foot level up, the consideration being $25,000 cash. W. A. Clark takes the ore out at his own cost, and timbers and keeps the mine in good shape, using his own shaft on the Colusa to raise the ore from the Liquidator ground. The Colusa shaft is within 40 feet of the Liquidator line. In the mean time, the Liquidator Company will continue to work its mine west from its shaft.

MOULTON.—It is stated that the company has purchased a controlling interest in the Poser mine for $48,000.

VULCAN.—The mine and other real estate, which had been under attachment for some time, was sold by the sheriff to Eastern capitalists, for $25,000. All the personal property belonging to the company was sold under attachment some time ago.

NEVADA.

Controller Hallock, in his annual report for the year 1885, places the gross yield of mines for 1885 at $6,847,405.30, and the net yield $939,336.19, on which the State tax was $8453.99.

ELKO COUNTY.

NEVADA *vs.* MAY QUEEN.—This suit, which has been on trial in the District Court at Elko during the past three weeks, has been concluded, the jury bringing in a verdict for the plaintiff, Lafferty, for recovery of possession of the Nevada ground, $12,000 damages and $2500 costs of suit.

EUREKA COUNTY.

EUREKA CONSOLIDATED.—Official advices state the production for January 1000 bars, valued at $15,905. The furnaces have stopped and will resume operations about May 1st. New hoisting-engines, roasting-furnaces, and refinery are contracted for.

STOREY COUNTY—COMSTOCK LODE.

From reports of the Virginia City *Chronicle*, we take the following:

The abstract statement from the assessment roll places the bullion proceeds of the mines of this county at $754,328.19 for the quarter ended December 31st, 1885, produced at a cost of $615,715.69. The total number of tons of ore from the crushing of which that amount of bullion resulted foots up 60,644. The total cost of mining, milling, and transportation, according to the statement, was a little less than $10.25 a ton. Notwithstanding that the mills were partially shut down on account of the scarcity of water the first half of the quarter, the bullion product exceeds that of the quarter preceding by $200,000. This is due to the increase in the ore yield from above the 1550 level of the Consolidated California & Virginia, formerly worked under the Jones contract. The total tax on the yield for the last quarter was $1069.94.

BEST & BELCHER AND GOULD & CURRY.—Operations are confined to draining the Osbiston joint shaft. This week, they expected to reach the line of pumps on the 2100 level.

CONSOLIDATED CALIFORNIA & VIRGINIA.—During the week ended the 12th inst., there were extracted and shipped to the Morgan mill from above the 1750 level 969 tons of ore, the assay value of which is given at $14.41 a ton. During the same period, 1720 tons were shipped to the Eureka mill, stoped out above the 1550 level. The value of this latter shipment is stated at $14.63 a ton.

CROWN POINT AND BELCHER.—The daily ore-shipments have averaged 350 tons, which is extracted from between the 1700 and 1600 levels. The explorations on the 1700 level of the Crown Point have devel-

oped, it is stated, the existence of a large deposit of ore above the milling grade.

JUSTICE.—It is rumored that the Thompson mill in Lower Gold Hill is to be fitted with concentrators and the extraction of ore from the south end begun on an extensive scale.

NEW MEXICO.

GRANT COUNTY.

ARGO.—The machinery for the company's mill now erecting on the site of the old Massachusetts & New Mexico Company's mill has partly arrived at Silver City.

PARAPET.—The new mill at Georgetown has begun regular work. The production of the mine is at large.

RAIN-IN-THE-FACE.—Arrangements have been made for beginning the erection of a five-stamp mill in connection with the Rain-in-the-Face mine, at East Camp.

SOCORRO COUNTY.

The following is an official statement of the product of the Billing works of Socorro for the year ended December 31st, 1885:

PRODUCT FOR 1885.

Lead, pounds (equal to 4651 $1:-.000 tons)	9,302,813 =	$372,112.52
Silver, ounces	909,652·58 =	$964,231.63
Gold, ounces	3,926·348 =	$81,157.61
		$1,417,501.76

Lead is valued at ·04, silver at $1.06 an ounce, and gold at $20.67. The plant was in operation without interruption during the whole year, but only worked to a little over two thirds its capacity. The three stacks and the roaster will in all probability work to their full capacity during the current year. In 1885, the roaster was in operation the greater part of the time.

GRAPHIC.—This plant, which had been idle for a year or more, changed hands in October from the La Joya & New Orleans Mining and Smelting Company to the present management, which blew it in about the middle of October, and from that time to the 31st of December, 1885, produced: Lead, 452,000 pounds; silver, 7910 ounces.

MERRITT.—Development on the Merritt mine continues and it will soon be in a position to yield uninterrupted supplies of mineral, which will insure the continued operation of the company's mill. During the brief period in which the mill operated in 1885, it yielded: Silver, $100,300; gold, $1700; total, $102,000.

MILLER.—Operations will soon be resumed.

SHERIDAN.—The erection of the company's mill at Cooney has begun. Development-work is going on in the mine, and a strike of rich ore is reported. The stock, rapidly advancing in price, is now quoted at $1.50.

SILVER HILL.—A diamond drill will soon be in operation. The lower tunnel in the Cooney mine will be driven 500 additional feet. The company closed down in August, 1885, for the purpose of erecting a plant of greater capacity. The bullion production for 1885 has amounted to $75,000.

SOUTH AMERICA.

PERU.

SAN JOSE DEL CABALLO MINING AND DEVELOPMENT COMPANY.—An English syndicate, controlling a majority of the capital stock, intends taking immediate and important action respecting the property. The American parties in interest are requested to communicate with Samuel W. Lewis, No. 7 Nassau street, New York City.

UNITED STATES OF COLOMBIA.

A convention of delegates was held in Bogota in December last, for the purpose of debating what should be done to restore the prosperity of Colombia and of preparing a new constitution for the country. President Nuñez called attention to the steady and rapid decline that has of late taken place in the commerce of the country, and intimated that her future prosperity lay in the mines, which are of great richness. A correspondent of the *Tribune* states that the president is anxious that foreign capital shall be invited to work the great natural resources of the Colombian mines. One American company has just established a mining bank in Medellin, and another has bought three sevenths of the rich silver mine of Del Zaucudo. There is considerable American capital invested in mining throughout the republic, and the Colombians are anxious to have more attracted here. The country is undoubtedly one of great mineral wealth, but the Colombians have neither the money nor the energy to develop it. In the whole nation, there are only six persons with a million dollars each, and the number with half a million each does not exceed thirty. The great mass of the people are abjectly poor, and small capitalists are reluctant to risk their money in enterprises regarding the success of which they are incapable of judging. So the gold and silver remains unmined, except by the foreigners who have invested capital here. The president says: "For Colombia, too, the day of prosperity will come. Will it come when the famous gold mines of Darien are once more put in operation; when by the aid of powerful machinery the upper strata are removed from the alluvial deposits of the Chico, or when the incalculable wealth is taken out of the beds of the rivers Atratc, St. Juan, Nechi, Porce, and Cacua, and their tributaries?" The unstable condition of affairs is readily recognized by the convention of delegates as the reason why foreign capital has not long ago developed the mineral resources of the country, and in drawing up the new constitution they propose not only to give the nation a more stable government, but to offer every inducement to foreign capital to come here. If concessions, grants, and privileges secured by treaty can attract English and American capital to the gold and silver of Colombia, they propose to do it.

UTAH.

SUMMIT COUNTY.

DALY.—At the annual meeting, the old officers were re-elected, namely: R. C. Chambers, President and Treasurer; John J. Daly, Vice-President; and these, with C. W. Bennett, George M. Scott, and R. Mackintosh, constitute the Board of Directors. T. J. Almy was elected Secretary. The company's mill is running successfully, and bullion shipments will now be made.

WASHINGTON COUNTY.

STORMONT.—Every thing is running smoothly again at the mines and mill. An average of fifty-seven tons of ore a day was taken to the mill during the week. There is a full supply of ore ahead, and the prospects are good for a long-continued run. The cross-cut on the south end of the Thompson, on the west side of the White Reef, struck the ledge this week, showing a body of good ore. The ledge is cut at a point 300 feet from the apex.

BULLION PRODUCTION FOR 1886—SPECIAL OFFICIAL REPORTS.

MINES.	States.	Month of January.	Year from Jan. 1st, 1886.
		$	$
Caledonia, G.	Dak.	25,464	.....
Christy, S.	Utah.	23.555	.....
Colorado Central, S	Colo.	24,844	.....
Elkhorn, G. S.	Mont.	23,456	.....
Eureka, S. L.	Nev.	15,905	.....
Father de Smet, G.	Dak.	17,452	.....
Freeland, G. S. C	Colo.	19,187	.....
Granite Mountain, S.	Mont.	113,600	.....
Hope, S.	Mont.	6.200	.....
Iron Hill, G.	Dak.	8,152	.....
Lexington, G. S	Mont.	62,850	.....
Montana Limited, G. S	Mont.	100,831	.....
Moulton, G. S	Mont.	62,050	.....
New Pittsburg, S	Colo.	2,060	.....
Plymouth Consolidated, G.	Cal.	55,683	.....
Plutus, G. L. C	Colo.	24 627	.....
Ropes, G. S.	Mich.	3,151	.....
Standard Consolidated, G.	Cal.	19,309	.....
Total		.....	.....

G., gold; S., silver; L., lead; C., copper; M., mica. Silver valued by the different companies from $1@$1.29 per ounce to $1.05; gold, $20.67. * Not including value of lead and copper. † Royalty. ‡ Net. —— No shipments during month mentioned. ** Not official.

MARKETS.

Silver.

NEW YORK, Friday Evening, Feb. 26.

DATE.	London. Pence.	N. Y. Cents	DATE	London. Pence.	N. Y. Cents.
Feb. 20	46¾	102⅛	Feb. 24	46⅞	102⅜
22	46⅝	101⅞	25	46⅞	102⅜
23	46¾	102⅛	26	46⅞	102½

Fluctuations, without apparent reason, in the Indian exchanges have kept the London market during the past week quite variable within a moderate range, and our market has been correspondingly affected.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2 per cent. During the week, the bank gained £228,373 bullion; and the proportion of its reserve to its liabilities was raised from 48½ to 49¼, against 46⅜ per cent at this date last year. On the 25th inst., the bank lost £56,000 bullion on balance. The weekly statement of the Bank of France shows gains of 15,700,000 francs gold, and 1,932,000 francs silver.

Copper.—The market here is quiet, and no important changes have occurred. Reports from abroad show a firmer feeling and a tendency to higher prices. Our quotations for Lake are 11·40@11½c.; Orford and Baltimore, 10⅛@10⅜c.

Cable advices to the Metal Exchange show the price of Chili Bars to have been in London during the week as follows: On the 20th inst., £40; 23d, £40 5s.; 24th, £41 2s. 6d.; 25th, £41 5s.; and 26th, £41. Best Selected during the same period has ranged from £44 5s. @£45.

Tin.—This metal has been steadier, and sales are reported at from 20·60@20·75c.

Foreign reports show an advance; £93 5s. is quoted for spot, and £93 12s. 6d. for three months. Tin Plates at Liverpool, 13s. 6d.

Lead.—The market has been active, and prices have ruled at from 4·90@5c., according to quality. As foreign can be imported at 5c., it is thought this will be a check on any further advance in domestic at present.

Soft Spanish lead is quoted in London to-day at £13 2s. 6d.; English, at £13 10s.

Messrs. Everett & Post, of Chicago, telegraph to us as follows to-day:

The market is rising, excited, and unsteady, and it is difficult to give exact quotations. There is a fairly active demand for both hard and soft lead, and prices are held stiff. However, sales will not aggregate 400 tons at 4·72½c., 4·75c., and 4·80c. spot. Offerings are very light. Corroding in demand, but little to be had.

Spelter.—Firm at 4·47½@4·62½c. for Domestic; 6¼@6½c. for New Jersey; and 5@5·15c. for Foreign. Silesian is quoted in London at £15.

Sheet-Zinc.—We quote 5@5¼c. for Domestic.

Antimony.—Foreign prices remain unchanged at £35. Hallett's sold here at 8¾@9c., and Cookson's at 9¼@9½c.

Nickel.—This remains nominally at 70c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 26.

American Pig.—During the past week, no changes of special importance have occurred in this market, and only sales of small lots are reported. The coke strike is virtually settled.

The nominal quotations are: $18@$18.50 for No. 1 X; $17@$17.50 for No. 2; and $16@$17 for Forge.

Scotch Pig.—Little is done in this market We quote Coltness $20.50@$21; Summerlee, $20@$20.50; Glengarnock, $19.50@$20; Dalmellington, $19; Eglinton, $18.50.

Cable advices show Scotch Warrants to be declining in price from 38s. 9d.@38s. 8d.; Coltness, 46s. 9d.; Langloan, 44s. 6d.; Summerlee, 48s.; Gartsherrie, 42s. 6d.; Glengarnock, 44s. 9d.; Dalmellington, 42s.; Eglinton, 39s. 9d.

Bessemer Pig.—We quote $19@$20 for Foreign, according to brand. A large sale is reported; but otherwise the market is quiet.

Spiegeleisen.—The market has declined. We quote English 20 per cent nominally at $27; German, $26@$26.50.

Steel Rails.—There are inquiries for small lots, but no sales of importance have been made. Prices at Eastern mills remain firm at from $34@$35.

Structural Iron and Steel.—We quote Angles, 1·95@2·10c. delivered; Tees, 2·35c.; Iron Beams and Channels, 3c. for American from dock; and Belgian, 2·60@2·75c.; Steel Angles, 2·30@2·45c.

Plate Iron.—Common Tank, 1·95@2c.; Refined, 2¼c.; Flange iron, 3·4@3·5c.; Extra Flange, 4@4·25c.

Bar Iron.—Refined we quote at 1·85@1.95c.; Common, 1·60@1·70c. Store prices are 10@20c. higher.

Steel Plates.—We quote 2½c. for Tank; 3@3¼c. for Boiler and Ship Plates; 3¼@4c. for Flanges; 4¼@5¼c. for Extra Flange and Fire-Box Plate.

Merchant Steel.—Our quotations remain, Ameri-

can Tool Steel, 8@10c.; special qualities, 12@18c.; Crucible Machinery, 4½@5½c.; Bessemer and Open-Hearth Machinery, 2¼@2½c.

Old Rails.—A little weaker under free offerings. Market quiet. We quote $21.25@$22 for Tees and $22@$22.50 for Double-Heads.

Old Steel Rails are quoted at $19.

Scrap-Iron—$21@$22 for Selected Scrap from yard. A sale of Foreign Scrap was made at $20.50 ex ship.

Philadelphia. Feb. 25.

[From our Special Correspondent.]

The volume of business in pig-iron has declined slightly within the past six days, as compared with the previous weeks. Buyers are less urgent for supplies and sellers are more indifferent. Buyers claim they can pay no more at present prices of finished products, and sellers insist they must get better prices in order to make up for the increased cost of production. Repairs are in progress in four or five furnaces of Eastern Pennsylvania, and a little additional increase in output will be made by the opening of spring. Prices are the same as last week, and it is doubtful whether a large order would be taken at any thing less, especially in forge iron, which is well sold up at nearly all furnaces that have the reputation for good iron. The makers of special irons have none to offer on the market, and are holding outside figures. Makers of standard irons are in a position to accept or reject offers without detriment. There were inquiries for 1000-ton lots of Forge this week, but no sales. Contracts have been entered for Foundry irons Nos. 1 and 2 at $19 and $17. Stocks are selling from furnaces at prices equivalent to $19.50 and $17.50 for prompt deliveries. Very few furnaces have any thing to sell that way, and if some makers are not mistaken in their opinions, they will be selling iron at 50 cents a ton higher in thirty days. That is to-day's prediction. Forge iron is very strong and very scarce, and even some of the low grades have been advanced 50 cents. Special Foundry is held at $17.50@$18. As to the probability of a general advance, agents say the market will take care of itself, but that prices will be higher before they are lower.

Muck-Bars.—A few lots have sold at $30, and certain makes are held at $30.50, but now and then a contract for a fair bar at $29.

Bessemer Pig.—The steel rail makers have closed negotiations for upward of 30,000 tons, and have negotiations in hand for much larger lots. One broker said there were inquiries in the market for from 55,000 to 60,000 tons, and there was nothing in the way of contracts closing within a short time for that amount. Spiegeleisen is also inquired for, but there is no great urgency, as running contracts will take care of buyers' requirements.

Manufactured Iron.—The stores are selling at $1.90. Makers of the best refined iron are getting $1.80@$1.85 without difficulty, but business is of a hand-to-mouth character with them. The ordinary irons are selling from $1.65@$1.80, and no one here is disposed to shade prices in the least. Manufacturers feel that merchant iron ought to sell one tenth higher, and are unwilling, and, in fact, unable to make any better prices. There are inquiries for 50-ton and as high as 100-ton lots, and generally the prospects for business are fair. For the past week, orders have not been placed, but this discouragement is offset by a good many inquiries. The car-builders are in the market for a good deal of stuff, and the ship-yards are looking about for material. John Spreckles, who has been here several days, negotiating for the construction of vessels for the Pacific trade, left yesterday for his home.

Nails.—The demand for nails has fallen off to the meeting of current inquiries, which are rather light at present. The business the nailers here are looking for is the spring and summer demand; but that is not forthcoming, because of the uncertainty as to things in the West, and the consequent uncertainty as to prices. Quotations are $2.40@$2.50.

Plate Iron.—All of the plate iron makers are doing a little more business, but are selling at low prices. The demand is not brisk enough to justify any advance, and not likely to be, owing to the extraordinary capacity of the mills of this State. Contracts were placed yesterday at 1·85@1·90c. Skelp iron is quoted at 1·80@1·85c. Tank sold at 1·90c.; ordinary Plates, 2c. There is a fair prospect for an improvement in this branch.

Structural Iron.—Structural iron is quoted at 1·80@2c. for Angles; Beams, at 3c.; Tees, 2·30@2·40c. The bridge-builders have been making but very few purchases of late, though manufacturers say they have fair indications to justify them in saying that their customers will be in the market in a short time for heavy supplies. Orders are sufficient to keep all our mills running full-time.

Sheet-Iron.—Card prices are fully maintained, and business is fair.

Wrought-Iron Pipe.—No change in card rates. Agents report the probability of a heavy demand, because of the large projected enterprises in the western end of the State.

Steel Rails.—Upward of 100,000 tons of rails have been contracted for this month, and but very little of the allotment remains to be sold. There are rumors on the street to-day that a meeting will be called within two weeks, but those who ought to know decline to say whether this meeting has been agreed upon. Quotations are $34@$35. There is a good deal of business to be transacted, and an increased production will be necessary. Some railroad authorities think that the entire capacity of the mills will be run to the fullest extent this season, and particularly so if some of the financial negotiations in New York go through.

Old Rails.—There is a good deal of hurrying to and fro among the brokers in old rails and old material generally, and some little business is doing, but the stuff is so scarce and so high that the minimum of business is transacted.

A great many labor disputes are in progress in this city, and are terminating one after the other in favor of organized labor.

Louisville, Ky. Feb. 24.

The sales of pig-iron continue light. Several inquiries have come from buyers, but no large transactions have been effected, as most of the Southern furnaces decline new orders, and are only shipping on sales already booked. The only lots of iron for sale are some odd grades for which furnaces do not book orders ahead, and some speculative lots that buyers are willing to sell at market prices. Prices remain firm and without change.

We quote for cash as below:

PIG-IRON.

Southern Coke No. 1, Foundry	$18 00@$18 50
" " No. 2, "	17.00@ 17.50
" " No. 2½, "	16.50@ 17.00
Hanging Rock Coke, No. 1. Foundry	18.00@ 18.50
" " Charcoal, No. 1, Foundry	20.00@ 21.00
Southern Charcoal, No. 1, Foundry	18.00@ 19.00
Silver Gray, different grades	16.50@ 17.50
Southern Coke, No. 1 Mill, Neutral	16.00@ 16.50
" " No 2 " "	15.00@ 15 50
" " No. 1 " Cold Short	15.50@ 16.00
" Charcoal, No. 1 Mill	17.50@ 18.00
White and Mottled, different grades	13.00@ 14.50
Southern Car-Wheel, Standard Brands.	25.00@ 26.00
" " " Other "	21.00@ 22.00
Hanging Rock, Cold Blast	27.00@ 28.00
" " Warm Blast	21.00@ 22.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 26.

Statistics.

Production Anthracite Coal for week ended February 20th, and year from January 1st:

TONS OF 2240 LBS.	1886. Week.	1886. Year.	1885. Week.	1885. Year.
P. & Read RR. Co.	189,959	1,269,277	138,476	1,049,486
L. V. RR. Co.	121,397	822,288	75,169	590,101
D. L. & W. RR. Co.	105,283	781,922	64,803	437,768
D. & H. Canal Co.	88,019	609,742	48,155	354,814
Penna. RR.:				
N. & West Br. RR.	32,565	192,807	.. ....	141,769
S. H. & W. B. RR.	4,189	22,780	.. ....	13,919
P. & N. Y. RR.	9,710	153,819	4,559	47 534
Penna. Coal Co	17,862	137,227	.. ....	78,083
Shamokin Div., N. C. RR	20.671	121,160	14,239	106,747
Lykens Valley	*9.500	64,148	6,892	62,596
Total	599,155	4,175,170	352,291	2,882,817
Increase	246,864	1,292,353	....	. .....
Decrease	... .	....	....	....

* Estimated.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1881	3,495,488	1883	3,552,821
1882	3,119,323	1884	3,214,545

Production Bituminous Coal for week ended February 20th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

EASTERN AND NORTHERN SHIPMENTS.

	1886. Week.	1886. Year.	1885. Week.	1885. Year.
Phila. & Erie RR.	22	272	.....	.....
*Cumberland, Md.	33,788	259,361	†	217,306
*Barclay, Pa.	3,356	30,693	†	31,453
*Broad Top, Pa.				
H. & Broad Top RR.	6,954	39,514	†	18,556
East Broad Top	.....	.....	.....	.....
Clearfield Region, Pa.				
Snow Shoe	2,865	20,639	†	26,112
Karthaus (Keating)	1,927	14,244	†	7,753
Tyrone & Clearfield	64,777	378,851	†	370,449
Alleghany Region, Pa.				
Gallitzin & Mountain	17,805	91,213	†	62,186
Total	131,494	834,787	†	733,815

* Tons of 2240 lbs.

WESTERN SHIPMENTS.‡

Pittsburg Region, Pa.				
West Penn RR.	4,954	32,299	†	32,715
SouthwestPenn. RR.	2,397	15,375	†	13,027
Pennsylvania RR.	3,720	32,342	†	23,701
Westmoreland Region, Pa.				
Pennsylvania RR.	36,044	192,527	†	143,002
Monongahela Region, Pa.				
Pennsylvania RR.	3,428	23,683	†	23,771
Total	50.183	296,226	†	236,216
Grand total	181,677	1,131,013	†	970,031

‡ Considerable gas-coal shipped East, of which no division is made in report.

Production of Coke on line of Pennsylvania RR. for week ended February 20th, and year from January 1st:

Tons of 2000 pounds.

	1886. Week.	1886. Year.	1885. Week.	1885. Year.
Allegheny Region.	4,069	26,037	†	24,199
West Penn. RR.	2,096	13,810	†	606
Southwest Penn. RR	9,681	170,682	†	216,973
Penn. & W. Region	7,424	44,331	†	32,551
Monongahela	336	7,157	†	7,953
Pittsburg Region.	.....	..	.....	.....
Snow Shoe	887	5,550	†	2,658
Total	24,493	267,567	†	284,940

† Reports for week ended February 21st, 1885, were not published at the time.

The Norfolk & Western Railroad Company reports the shipments of Pocahontas Flat-Top coal for the week ended February 20th, 1886, and year from January 1st as follows, tons of 2000 pounds: 1886—Week, 14,734; year, 103,607. 1885—Week, 9,634; year, 66,969. Increase, 1886—Week, 5100; increase, year, 36,616.

Anthracite.

More mild weather, excessive production, and a failure to do any thing to harmonize the trade, with no indications of any thing to be done, have caused prices to become very weak and developed afresh the bad feeling, which for a time appeared to be moderating. Late last week, the Pennsylvania Coal Company made a cut of 10 cents a ton, selling Stove coal at $3.30 alongside in this city. That, of course, was only meeting what many individuals were doing, and is not the bottom to-day. We hear of Stove coal as low as $3@$3.10 a ton f. o. b., and Broken and Egg at $2.65; while we learn of actual sales of the latter sizes, for cash, at $2.40 a ton.

The other companies have not yet met the Pennsylvania Coal Company's cut but it can not be long before they are driven to it in self-protection.

Yesterday's Philadelphia *Press* contained the following:

The negotiations for a coal combination are at a stand-still for the moment; but the percentages have been practically agreed on, and when the companies get ready, there will be no difficulty about completing the arrangements. The proposed combination will not be a contract to restrict coal, but there will be an understanding between the companies that they will ship only the allotments agreed upon. The following figures will be found to be about the correct ones when the allotments are finally agreed upon:

COMPANIES.	1885. Actual percentages shipped of a total of 31,623,529 tons.	1886. Proposed percentages of expected shipm'ts of 34,000,000 tons.	1885. Allotted percentages on 30,000,000 tons.
Reading	36·9	37·0	38·85
Lehigh Valley	19·3	19·5	19·60
D., L. & W	15·7	16·5	16·05
Delaware & Hudson	10·4	11·0	11·00
Penna. RR	10·8	9·5	8·00
Penna. Coal Co.	4·7	4·5	5·00
Erie	2·0	2·0	1·50

This represents the nearest approach to accomplish-

ing something, and under certain conditions "might have been." The conditions, however, have sustained some great changes during the past week. The Drexel-Morgan syndicate, as stated by us a week ago, has had a severe set-back, and Mr. Gowen has come to the front and completely demoralized, even though he may not have defeated, his enemy. The result of this is that every thing is at sixes and sevens again, and we fear that, for some time, at least, it will be impossible to accomplish any thing.

With the work done, we think it would be a very easy matter to close a coal combination, were the coal trade the only thing to be considered; but unfortunately such is not the case. Trunk lines and other questions are involved; and Wall street speculations still hold no unimportant part. If Mr. Gowen develops enough strength to make his chances of successfully reorganizing Reading probable, he will also develop an antagonism from the Pennsylvania, greater than that company has ever shown before, and the coal trade will be made to suffer to a corresponding degree. The Pennsylvania Railroad practically offered to throw away $5,000,000 to stop the construction of the South Pennsylvania road, but was prohibited by the courts from doing so in the manner proposed. It is not improbable that the company would be willing to lose considerable money if, by doing thus, it could so demoralize the coal trade, and especially Reading's affairs, as to prevent Mr. Gowen from succeeding in reorganizing the company and building the South Pennsylvania road. Mr. Gowen is a red flag to the Pennsylvania management; and well backed, he will be the cause of trouble that will counteract much of the good he hopes to accomplish.

The Western Anthracite Coal Association held a meeting in this city, at the Fifth Avenue Hotel, yesterday. Prices were left unchanged. The allotment for February was fixed at 500,000 tons. The allotment for January was the same amount, but only 367,076 tons were shipped. The shipments from May 1st, 1885, until February 1st, were 5,748,945 tons, under an allotment of 5,550,000 tons. Delaware, Lackawanna & Western absorbed more than half the excess.

We quote f. o. b. as follows for ordinary free-burning coals:

Lump	$2.80@$3.00
Steam coal	2.80@ 3.00
Broken	2.65@ 2.80
Egg	2.65@ 2.80
Stove	3.00@ 3.25
Chestnut	2.85@ 3.00
Pea	1.50@ 1.75
Buckwheat	1.25@ 1.50
Dust	1.00@ 1.15

Bituminous.

The market seems to be a waiting one, and but little change is expected until after March 1st, and even then threatening labor troubles may still further postpone the true conditions of the market we are to have for this year. We think the fear of labor troubles has caused many shippers to act conservatively, for the moment at least, as there is certainly less inclination to slaughter coal than there was. Beech Creek coals seem to be the only ones that are offered very low. They are, in cases, offered about as low as last year. Vessels have been scarce and rates firm at $1.25 from Philadelphia and $1.45 from Baltimore to Boston.

The circular sent to the presidents of the coal companies operating mines in the Clearfield, Irwin, Garrett, and Meyersdale, Pennsylvania; George's Creek, Maryland; Elk Garden, West Virginia; Pocahontas, Virginia, Districts by the National Federation of Miners and Mine Laborers of District No. 3 has been a source of much uneasiness during the past week. The following scale of prices per ton for mining coal in the various districts was adopted by the association; all other labor to be paid in proportion; the same to be binding for one year, and to go into effect on Monday, March 8th, 1886: Clearfield, 50 cents; Irwin, 60 cents; Garrett, 40 cents; Meyersdale, 40 cents; George's Creek, 50 cents; Elk Garden, 50 cents; Pocahontas, 45 cents. The operators have been asked to meet the Executive Committee of the Miners at Cumberland, March 1st.

Although the committee gets into rather deep water in looking for causes for an advance in wages, it is evident, nevertheless, that it means business, and this is the construction the operators place upon it. Labor has been so successful of late, and especially in the large strike in the coke districts, just settled, that it has become very aggressive and quite confident. It is difficult to say what will be the outcome of this latest movement. The trade can ill afford to make an advance at present; yet, if it must come, it could not be at a more opportune time in the year. Very few contracts have been closed, and the advance, if made, would affect all the operators alike.

The advice to the operators on combining, contained in the circular, is well worthy their consideration; but the "example" that we consider more worthy of their attention, is the firm and honest compliance with their agreements with each other, shown by the miners. Seven anthracite, and four or five bituminous managers are unable to comply with their agreements, while thousands of less intelligent miners stand as firmly as a rock.

The Erie road is spreading out in the Northern markets for a bituminous trade that is not justified in the geographical position of the coals that are forced. This is creating some ill feeling with the Pennsylvania road, which may develop trouble later unless it is stopped.

Buffalo. Feb. 25.

[From our Special Correspondent.]

The committee appointed by the mayor of our city to visit Pittsburg, Oil City, Bradford, and other points to investigate the workings of the natural gas system for heating and manufacturing purposes, etc., has returned home and is preparing an elaborate report, which will probably be made public next week.

There is nothing of interest in the situation of the anthracite and bituminous coal and coke trade.

The soft coal miners and shippers of this port are greatly exercised over the important fact that is here given in detail in the words of a local itemizer: "General Manager Hickson, of the Grand Trunk Railroad of Canada, has not consulted our Buffalo coal men this year in letting the contract for his supply coal at the bridges, but has awarded it in one lump to Bell, Lewis & Yates of this city. This they consider a most unheard-of affair. They have for years been invited to visit Montreal and submit their bids, but now they are cut off, and without warning. To be sure, they claim they were badly used at Montreal, the high officials of the road allowing them to toast their shins at the hotels for weeks, while they took plenty of time to make up their minds to whom the plum should be given. The Buffalo shippers also complained that their bids were opened and inspected by their competitors, who were invited to meet the figure and take the contract. This was bad; but it was not nearly so bad as seeing a 400,000-ton contract go without even knowing that it was going.

"The firm which has the contract has no confessions to make, and it may be some days before the disconsolate ones find out the precise way in which they were euchered. Bell, Lewis & Yates, to make matters worse for the outsiders, have plenty of coal to sell. Besides their own extensive mines through the Reynoldsville District, they control the output of the Erie Railroad Company's Dagus mines and the entire production of the Buffalo, Rochester & Pittsburg. The Dagus coal is rated at about 20 cents per ton off price, as compared with their other coals, or with those of the Reynoldsville region; but all the rest is first-class.

"The Buffalo, New York & Philadelphia having recently made the firm of J. Langdon & Co. its sales-agents, had strong hopes of controlling the lion's share of the contract; but it, like the others, is out in the wet. The only reason that can be divined for General Manager Hickson's action is, that he did not wish the Buffalo men to come to Montreal and expose themselves to small-pox. The most aggravating fact of all is, that the contract was let to Bell, Lewis & Yates nearly a month ago, and the others have just found it out. At what price the contract was let is unknown, but it is surmised that the fortunates shaded the $1.80 rate made last year. This contract is so large that it makes the price, and the awards of the New York Central and the Michigan Central, which are to follow, will presumably be at the same figure."

Considerable discussion has taken place during the past few days among the anthracite coal men relative to the slashing article published in the New York *Commercial Advertiser* relative to the combination proposed to control the anthracite coal product and market. Let one extract therefrom suffice here: "If the plans formed for it shall be successfully carried out, they will furnish an unusually apt illustration of the fact to which we directed attention some months ago, namely, that the real dangers from wealth are not those that are supposed to attend the growth of personal fortunes so much as those that are incident to the growth of corporated monopolies."

Mr. Thomas Hodgson, President of the Coal Exchange, was appointed a member of the Transportation Committee of the Merchants' Exchange last week.

The Merchants' Exchange last Saturday unanimously adopted resolutions indorsing the Weber Canal bill, to which reference was made by me last week.

The Buffalo & Geneva Railroad is to run through the counties of Erie, Genesee, Monroe, Livingston, and Ontario, and the survey will be commenced the end of March. Mr. J. Imbrie Miller will be chief of the corps of engineers.

The soft coal pool has effected an organization. The output has been adjusted and freight rates agreed to. The details will be made public this week. The managers state that the object of the pool is not to raise the prices, but to steady them. "With the increased manufacturing prosperity expected, a favorable result must be attained to all concerned," says a man who ought to know from his position in the trade. A correspondent says that the action of the Lehigh Valley Railroad Company in sending the coal of its Snow-Shoe region to Buffalo this year in the combination at that point against the Buffalo, Rochester & Pittsburg Railroad coal, is said to be part of a compact with the Pennsylvania Railroad Company. It takes that much soft coal out of the Eastern market and strengthens the soft coal pool there. In return for this, the Pennsylvania will act with the Lehigh Valley in the anthracite pool when formed.

It is stated that the Buffalo, New York & Philadelphia Railroad has united in the pool with all the coal companies of Buffalo, excepting the Buffalo, Rochester & Pittsburg Railroad. What effect will the contract of Messrs. Bell, Lewis & Yates, alluded to elsewhere, have upon said pooling arrangement?

A dispatch from Philadelphia, February 21st, says that the officials of the Buffalo, New York & Philadelphia Railroad Company state that they have united in the pool with all the coal companies of Buffalo, excepting the Rochester & Pittsburg Railroad. The coals are to be sold at figures that will enable them to compete with and secure the trade of the Rochester & Pittsburg Railroad. In order to do this, the coals may have to be carried by their road at very low rates of freight, and possibly at a loss, for a limited time; but they are willing to do this, in order that they may establish better prices for coal in Buffalo and derive benefit therefrom in the future.

Contracts have been awarded for eleven sections of the proposed Welland Canal enlargement. The aggregate amount was $400,000. The work will be pushed with vigor. Vessels drawing 12 feet of water now pass the locks; when the alterations are completed, 14 feet will be the minimum depth.

The Northern Central Railroad's report for 1885 states that the total coal tonnage (anthracite and bituminous) was 4,490,621 tons, an increase over 1884 of 733,928 tons.

The Buffalo, New York & Philadelphia Railroad carried 209,475 tons of anthracite and 944,700 tons of bituminous coal during the year ended September 30th, 1885. The financial troubles of this company are said to be caused by the unprofitable rates obtained for its bituminous coal traffic.

Boston. Feb. 24.

[From our Special Correspondent.]

There has been more life to trade of late. There is a genuine need of more coal, as stocks are reduced hereabout. There is also a little disposition to anticipate the immediate needs of trade. The high freights are a barrier, for they are at this time fully 50 cents above the rates in summer. The combination still refuses to combine. President Gowen is still in the way of the Pennsylvania syndicate, and is likely to remain so until persuaded that interests given over to his keeping will be properly treated. While there is reason to anticipate a peaceable settlement of pending difficulties, it is clear that there is much to be overcome and harmonized. F. o. b. prices at New York are as low and as weak as they have been since the efforts to form a combination were begun.

There is more activity in soft coal, and a very fair amount of tonnage has been placed in moderate-sized contracts. Every one is dumb on the question of prices, but it is evident that last year's delivered prices are duplicated, if not lowered. The pool continues

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Feb. 20.		Feb. 22.		Feb. 23.		Feb. 24.		Feb. 25.		Feb. 26.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	1.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	.....	400
Amie Con., Co.	.04	.....	.....	.....	.....	.....	.....	.....	.04	.....	.03	.....	4,600
Argenta	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.11	.....	.....	.....	.10	.....	.....	.....	200
Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Cons., Ca.	1.60	.....	.....	.....	1.65	.....	.....	.....	1.55	.....	1.60	.....	1,300
Breece	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer, Ca.	.55	.....	.....	.....	.68	.55	.....	.....	.60	.59	.62	.....	4,500
Cal.. B. H.	2.00	.....	.....	.....	1.95	1.90	1.90	.....	.....	.....	1.95	1.80	2,400
Castle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Central	.....	.....	.....	.....	.....	.....	2.40	.....	.....	.....	2.40	.....	600
Cons. Cal. & Va., Ne.	2.30	.....	.....	.....	2.25	.....	2.50	2.35	2.50	.....	2.45	.....	3,825
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.39	.38	.....	.....	.43	.40	.40	.....	.....	.....	.....	.....	600
Eureka Cons., Ne.	2.10	.....	.....	.....	.....	.....	2.50	.....	.....	.....	.....	.....	410
Father de Smet, Dk.	2.10	.....	.....	.....	2.15	.....	2.20	.....	.....	.....	.....	.....	900
Freeland	.....	.....	.....	.....	1.25	.....	.....	.....	.....	.....	.....	.....	400
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Ne.	2.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Hall-Anderson, N. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	20.50	.....	.....	.....	.....	.....	19.00	.....	19.50	.....	19.50	19.00	140
Horn-Silver, Ut.	.....	.....	.....	.....	3.65	3.55	3.60	.....	3.45	.....	3.50	.....	2,925
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	2.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Leadville C., Co.	.....	.....	.....	.....	.28	.....	.....	.....	.....	.....	.....	.....	200
Little Chief, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.28	.....	.27	.....	500
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moulton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.....	100
Ontario, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.....	.....	.....	.....	.....	.....	15.00	.....	.....	.....	.....	.....	50
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	22.00	.....	.....	.....	200
" Com., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Quincy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson Cons., Co.	.....	.....	.....	.....	.....	.....	.90	.....	1.00	.80	.94	.89	6,650
Savage, Ne.	1.25	.....	.....	.....	.....	.....	.....	.....	1.25	.....	.....	.....	425
Sierra Nevada, Ne.	.....	.....	.....	.....	.....	.....	.85	.....	.90	.....	.90	.85	1,400
Silver King, Ar.	6 63	.....	.....	.....	.....	.....	.....	.....	6.88	.....	.....	.....	200
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	1.10	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....	150
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	1.20	.....	.....	.....	1.20	.....	900

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALE
	Feb. 20.		Feb. 22.		Feb. 23.		Feb. 24.		Feb. 25.		Feb. 26.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alta	.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	4,100
American Flag	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bechtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belcher	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'lcher, G. S.	.....	.....	.....	.....	.....	.....	1.60	.....	.....	.....	.....	.....	250
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bowman Silver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.....	.....	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	200
Chollar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cusi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harshaw	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kossuth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Pittsburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plutus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	4,700
Red Elephant, S.	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.11	.....	500
Ridge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.12	.....	1,100
Sonora Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.08	.....	.....
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.20	.....	.....	.....	.19	.....	.19	.18	.18	.....	.20	.19	12,300
Tamarack	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. S.	.....	.....	.....	.....	.....	.....	.60	.....	.....	.....	.....	.....	300
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Dividend shares sold, 34,575. Non-dividend shares sold, 23,450.

lightly regarded as affecting this business already placed. Dealers are talking pool strongly, however. They are insisting that the agreement is on the basis of 1,265,000 tons to the Pennsylvania ; 1,035,000 to the Baltimore & Ohio ; and 500,000 tons each to the Norfolk & Western and Chesapeake & Ohio. Further, that the f. o. b. rates of $2.25 at Baltimore and $2.35 at Philadelphia, Newport News, and Norfolk are binding. It is yet to appear that the pool is worthy of consideration, however, so much coal having already been sold on a lower basis. It is said that as much soft coal will be moved all rail as possible. As for water freight, the fear of higher rates this year has been unheeded, recklessly or otherwise.

The Lowell road is believed to have bought its yearly supply. President Morey of that road is reported as saying that their arrangements are made. The Pacific Mills have bought ; also, the Tremont and Suffolk, and Hamilton and Appleton. Large contracts are quoted at $3.25@$3.35, delivered, and cargo lots for immediate delivery at $3.70@$3.75.

There is no movement in gas coal yet. Dealers are awaiting opening prices.

"Fairly firm" is the story for freights, quoting previous high rates.

We quote, exclusive of discharging :

New York, $1.15@$1.25 ; Philadelphia, $1.25@$1.30 ; Baltimore, $1.30@$1.40 ; Newport News, $1.20@$1.30 ; Richmond, $1.30; Cape Breton, $1.60@$1.75 ; Bay of Fundy, $1.40@$1.50.

There is no movement of importance in retail trade. Prices are unchanged.

FINANCIAL.

Mining Stocks.

NEW YORK, Friday Evening, Feb. 26.

Renewed activity and a larger business have been the features of the mining market during the past week. The total transactions were 58,025 shares, showing an increase of 3552 shares, as compared with the preceding week.

The strength in Robinson has been the feature in the Colorado stocks. This movement is due to the dividend shortly payable. The price has ruled from 80c. @$1, closing at 89c., with sales of 6650 shares. Amie shows a large business at 3@4c. Silver Cliff, 8c Freeland has been quiet at $1.25. Colorado Central, $2.40. Dunkin advanced from 38@43c.

Bodie Consolidated has been higher and firm at $1.55@$1.65. Bulwer, at from 55@68c. The financial statements, February 15th, show a cash balance of $17,770.61. Standard, $1. Plymouth Consolidated has announced its thirty-fourth dividend, making a total of $1,600,000. The stock is quiet at $15. Quicksilver Preferred is quoted at $22.

Sutro Tunnel again begins to show the periodical activity for which it has been noted during the past year ; sales have amounted to 12,300 shares at from 18@20c. Consolidated California & Virginia shows its usual business at higher prices, ranging from $2.25@$2.50. Hale & Norcross is firm at $2.35. A small business at the usual prices was done in a number of other Comstock shares. Eureka shows a few sales at from $2.10@$2.50.

Caledonia has declined from $2@$1.80. Homestake has been active at lower prices, ranging from $20.50 @$19. Father de Smet has been firm at from $2.10@$2.20.

Horn-Silver holds its own at from $3.45@$3.65. A few sales were made in Alice at $1.65@$1.50. Silver King, $6.63@$6.88.

$525 New York & San Jorje Hydraulic Gold Mining Company 10 per cent bonds were sold at auction in this city on the 24th inst. at $14 lot.

Coal Stocks.

The past week has been one of uncertainties, and the market shows no well-defined course, although the tendency seems to be downward. It is a good market to let alone, and one that can not be understood by the ordinary observer. The movements are almost entirely due to manipulation, and opposed to natural causes ; and for some time, at least, this condition is likely to prevail. Surprises have been plentiful during the past month, and we do not think that they are entirely exhausted yet, although it may be impossible to say upon which side they will occur.

The dealings in Delaware, Lackawanna & Western have been 631,905 shares at $128⅜@$124½@$129@$126¼, closing at $127¼. Delaware & Hudson records sales of 67,744 shares at $104¾@$100½, closing at $102⅜. The transactions in Reading amount to 166,095 shares at $27@$24½, closing at $25⅛. The dealings in Jersey Central aggregate 115,132 shares at $51⅛@$54¾@$53⅛, closing at $54¼.

The bituminous stocks have been quiet but firm. We look favorably upon these with ordinarily good conditions in other directions.

Meetings.

The annual and special meetings of the following companies will be held at the times mentioned :

Adventure Copper Company, No. 2 Exchange Court (Room 22), New York City, March 4th, at twelve o'clock M.

Andover Iron Company, No. 240 South Third street, Philadelphia, Pa., March 10th, at eleven o'clock A.M.

Atlantic Mining Company, No. 76 Wall street, New York City, March 9th, at twelve o'clock M.

Flat Top Coal Company, No. 34½ Pine street, New York City, March 1st, at eleven o'clock A.M.

Midas Petroleum and Improvement Company, Room 9, No. 516 Market street, Pittsburg, Pa., March 9th, at ten o'clock A.M.

Rara Avis Gold and Silver Mining Company, No. 201 Walnut street, Philadelphia, Pa., March 1st, at four o'clock P.M.

Dividends.

Big Bend Hydraulic Mining Company, of Dakota, has declared a dividend (No. 25) of $6000, payable February 20th, at the company's office, No. 181 Broadway, New York City.

Charleston Mining and Manufacturing Company, of South Carolina, has declared a quarterly dividend of two dollars and fifty cents, and an extra dividend of one dollar a share, payable March 1st, at the company's office, 132 Walnut street, Philadelphia, Pa.

Delaware & Hudson Canal Company has declared a quarterly dividend of one and a quarter per cent on the capital stock, payable March 15th, at the National Bank of Commerce, New York City.

Harshaw Mining Company, of Arizona, the final distributive dividend of twenty-six and a half cents a share will be payable on and after the 3d day of March, upon presentation and surrender of certificates to William N. Olmsted, Receiver, at No. 18 Wall street.

Indiana Block Coal Railroad Company gives notice that, in accordance with the terms of the mortgage securing the same, Bond No. 25 for $1000, issued by the Indiana Block Coal Company, has been drawn

for the sinking fund. The bond will be paid on presentation at the office of the Farmers' Loan and Trust Company, in New York. Interest thereon ceased on February 1st.

Locust Mountain Coal and Iron Company has declared a dividend of three per cent, payable March 2d.

Paradise Valley Mining Company, of Nevada, has declared a dividend of 10 cents a share.

Plymouth Consolidated Gold Mining Company, of California, has declared a dividend (No. 34) of twenty-five cents a share, or $25,000, payable March 5th, at the company's office, No. 23 Nassau street, New York City.

Queen of the Hills Mining Company has declared a dividend of 12 cents a share.

Small Hopes Consolidated Mining Company, of Colorado, has declared a dividend (No. 38) of twenty cents a share, or $50,000, payable February 27th.

Tuna Oil Company, of Pennsylvania, has declared an extra dividend of ten per cent, payable on the 23d inst., at the company's office, Philadelphia, Pa.

ASSESSMENTS.

COMPANY.	No.	When levied.	Delinquent in office.	Day of sale.	Amount.
Alta, Nev.	33	Feb. 1	Mar. 5	Mar. 25	.25
Andes, Nev.	28	Feb. 16	Mar. 23	Apl. 12	.25
Baltimore, Utah	1	Dec. 26	Feb. 1	Mar. 4	.01
Belcher Cons., Cal.	3	Dec. 23	Jan. 25	Feb. 27	.30
Benton Con., Nev.	15	Feb. 4	Mar. 11	Mar. 30	.10
Best & Belcher, Nev.	33	Jan. 6	Feb. 10	Mar. 9	.50
Black Hills Oil, Dak		Feb. —	Mar. 15	Apl. 10	.02
Bodie Tunnel, Cal.	12	Jan. 21	Feb. 27	Mar. 22	.15
Buchanan, Cal.	15	Feb. 9	Mar. 17	Apl. 5	.25
Con. Pac., Cal.	8	Feb. 18	Mar. 22	Apl. 15	.15
Courier, Utah		Feb. 3	Mar. 11	Mar. 31	.03
Enterprise Dak.		Feb 6			.01
Far West, Dak	7	Jan. 12	Feb. 16	Mar. 5	.02
Forty Nine, Cal	1	Feb. 4	Mar. 15	Apr. 5	.10
Jupiter, Utah		Jan. 4	Feb. 12	Mar. 11	.01
Hale & Norcross, Nev.	89	Feb. 11	Mar. 18	Apl. 8	.50
Johnson Gravel, Col.	3	Feb. 3	Mar. 8	Apr. 6	.02
Lady Wash., Nev.	5	Feb. 4	Mar. 9	Mar. 29	.05
Liberty, Dak.	1	Jan. 14	Feb. 15	Mar. 15	.01
Mexican, Nev	31	Feb. 9	Mar. 15	Apl. 8	.25
Navajo, Nev	14	Jan. 9	Feb. 15	Mar. 8	.30
Opohir, Nev.	50	Feb. 4	Mar. 9	Mar. 29	.30
Peer, Ariz	4	Jan. 1	Feb. 14	Mar. 5	.10
Peerless, Ariz	6	Jan. 1	Feb. 12	Mar. 2	.20
Potosi, Nev	22	Feb. 5	Mar. 9	Mar. 31	.30
Rainbow, Dak.	1	Feb. 2	Mar. 8	Mar. 27	1-10
Savage, Nev	65	Jan 4	Feb. 9	Mar. 1	.50
Seabury Calkins, Dak.		Jan. 21	Mar. 1	Mar. 20	.02
Sierra Nevada, Nev.	84	Jan. 5	Feb. 9	Mar. 1	.25
Union Cons., Nev.	32	Jan. 11	Feb 15	Mar. 8	.25

Pipe Line Certificates.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

There has been no decided movement in oil this week, 81⅛ and 77¾c. covering the fluctuations. The buying by a few prominent houses encourages the belief that an early attempt will be made to engineer an advance, but the feeling is perhaps more bearish than otherwise. This is due to the advance figures of monthly field work, which will show an increase in new production and in number of wells under way.

The refined market was run up from 7⅝c. to 7⅝c., but is back again. The Thayer well in Washington County is a good one, and yields about 240 barrels daily. The crowd are afraid of new wells, etc., but from a speculative position we should rather expect a moderate advance.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 20	77⅛	81½	77¾	80⅝	9,521,000
22					
23	80½	81½	79⅞	79⅞	4,746,000
24	79¾	80⅝	78¾	80⅜	5,521,000
25	80¼	80¼	78¾	79⅝	4,523,000
26	79½	79⅞	79	79⅜	2,729,000
Total sales					27,040,000

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Feb. 25.

There is a strong undertone to the market for copper stocks, and it looks as if much higher prices would prevail in the near future. The demand for the low-priced stocks is increasing, and we look for an active speculation in this class during the spring and summer months. The dividend-payers are in good demand, and are generally higher than last week. Calumet & Hecla advanced from $221@$225 on very small sales. The prospect of yearly dividends of $20 a share serves to induce buying, while the small amount of floating stock in the market renders it difficult to fill orders except at higher prices. Quincy has been active, but lower on the free offering of stock, and shows a decline from $50½@$49, with a slight rally to $49½; sales, 650 shares. Franklin was a little heavy in the early dealings, and declined to $12½, but fresh orders to buy caused an advance to $13¾, and small lots sold at $14; sales, 1300 shares. This stock is booked for much higher prices. Osceola declined to $15, but rallied to-day and sold at $15¾; sales, 400 shares. In the speculative list, Huron was the most active, selling in the early dealings at $2⅛. It was in brisk demand to-day, and sold up to $2⅜; sales, 1500 shares. Pewabic sold at $2⅞—200 shares. Allouez at $1—300 shares. Ridge, 300 shares, sold at 75c. Total sales copper stocks, 4800 shares.

In silver stocks, Bonanza sold at $1½. Crescent, 15@22½c. (1500 shares). Catalpa, 500 shares, at 40c. Dunkin, 41@40c. Boston & Montana, active at $8, seller 30, 1100 shares, and $8 1/16, buyer 60 days; 2000 shares sold.

At the Mining Exchange, business has ruled quiet, and prices generally show but little change. Bowman Silver, dull at 16@18c. Milford, firm at 60@61c. Dunkin, 36@40c. In miscellaneous stocks, there is but little doing.

3 P.M.—Closing prices: Calumet & Hecla, $226 bid. Quincy, $49¼ bid, $50 asked. Franklin, $13⅞ bid, $14 asked. Osceola, $15½ bid, $16 asked. Huron, $2⅝ bid, $2¾ asked. Tamarack, $88@$90.

COAL STOCKS.

NAME OF COMPANY.	Par value of shares.	Quotations of New York stocks are based on the equivalent of $100. Philadelphia prices are quoted so much per share. Feb. 20. H.	Feb. 20. L.	Feb. 22. H.	Feb. 22. L.	Feb. 23. H.	Feb. 23. L.	Feb. 24. H.	Feb. 24. L.	Feb. 25. H.	Feb. 25. L.	Feb. 26. H.	Feb. 26. L.	Sales from Feb. 20th to Feb. 26th, inclusive.
Barclay Coal														
Cameron Coal	50	15½	15¼			15						14¾		431
Col. C. & I	10	25	24½			25⅛	25			25⅛	24½	24¾	24⅛	2,700
Ches. & O. RR	100					11		11¾	11	11½		11½	10⅞	1,280
Consol. Coal	100													
Cumb. C. & I	100													
Del. & H. C	100	104¾	102½			103¾	100⅛	104⅜	102⅜	102½	102⅛	102⅛	100¾	67,744
D., L. & W. RR	50	128⅜	125			128⅝	124½	129	127¾	128	126⅝	127⅞	126¼	631,905
Elk Lick Coal Co														
Lehigh C. & N.†	50	51⅝	51			50¾	50⅝	50⅞	50⅝					6,032
Lehigh Valley RR.†	50	59½				58½		57½						161
L. & W. C. & I. Co.														
Maryland Coal	100													
Montauk Coal	100													
Morris & Essex	50	137	136⅝			137		137				137½		520
New Central Coal	100	14										11⅞	11¾	400
N. J. C. RR	100	54⅜	51⅛			53⅝	52	54⅜	53⅛	54¼	53½	54½	53¼	115,132
N. Y. & S. Coal	50													
Penn. Coal	50													
Penn. RR †.	50	55⅜	55¼			55¼	54¾	55	54¾					5,020
Ph. & R. RR.*	50	25½	23⅛			26	25⅛	27	25½	26¾	24⅞	25⅝	24½	202,026
Spring Mountain	50													
Westmoreland Coal†	50							66						4

* Of the sales of this stock, 35,931 were in Philadelphia, and 166,095 in New York.
† The quotations for these stocks are not percentage, but actual price. Total sales, 1,033,357.

San Francisco Mining Stock Quotations.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Feb. 19.	Feb. 20.	Feb. 22	Feb. 23	Feb. 24.	Feb. 25.
Albion						
Alpha						
Alta	.10			.10	.10	.10
Argenta						
Bechtel						
Belcher				1.00		1.12½
Belle Isle						
Best & Belcher	1.37½	1.25		1.50	1.75	1.50
Bodie	1.75	1.75		1.62½	1.50	1 50
Bullion						
Bulwer	.60	.60		.60	.60	.55
Challar	.85	.85		.85	.95	1 00
Con. Pacific	.20				.20	.20
Con. Cal. & Va.	2.25			2 37½	2.50	2.37½
Crown Point	1.12½	1.12½		1.25	1.12½	1.25
Day						
Elko Cons						
Eureka Cons	1.87½	2 12½		2.75	2.75	2.25
Exchequer						
Gould & Curry		.80		.90	1.12½	1.00
Grand Prize						
Hale & Norcross	2.25	2.25		2.25	2.25	2.37½
Independence						
Martin White						
Mexican	.35	.35		.35	.45	.40
Mono	4.25	4 25		4.00	4.00	3.75
Mount Diablo				3 50	3 50	3. 0
Navajo	.35			.35	.40	.40
Northern Belle						
North Belle Isle						
Ophir	.50	.50		.50	.60	.60
Overman						
Potosi	.30	.30		.35	.40	.40
Savage	1.12½	1.25		1.25	1.37½	1.37½
Scorpion						
Sierra Nevada	.65			.80	.85	.85
Silver King						
Tip-Top						
Union Cons	.60	.55			.65	.60
Utah		.70		.75	.80	.75
Wales Cons						
Yellow Jacket	.95	1.00		.95	1.00	1.00

Unlisted Stocks and Foreign Quotations.

We give below the most reliable quotations obtainable for unlisted stocks and quotations on outside and foreign exchanges:

NAME OF COMPANY.	Location.	Price.	Where quoted.
Adams, s. L.	Colo.	$4@$5	Unlisted
Bellevue, s. L.	Idaho	$5	Unlisted
Big Bend H'd'le, G.	Dak.	$5	Unlisted
Bird's Eye Creek, G.	Cal.	$6.25@$7.50	London
Bonanza King, G.	Cal.	$10	Unlisted
California, G.	Colo.	50@75c.	London
Col United, s. L.	Colo.	$16 33@$16.87½	London
Eb'rh'dt & Mon't'r, S	Nev.	$1.12@$1.37	London
Elkhorn, G. S.	Mont.	$10	Unlisted
Golden River, G.	Cal.	$116*	Paris
" Parts Civil-s	Cal.	$46*	Paris
Granite Mt, s.	Mont.	$21	St. Louis
Helene, G S L C	Mont.	$2	Helena
Honorine, s L.	Utah	75c.	Unlisted
Kohinoor & Donaldson, G. S.	Colo.	37@62c.	London
La Plata, s L.	Colo.	$1.25@$1.50	London
Lexington, G S	Mont.	$1 50	Paris
"Org'niz'n" shares	Mont.	4 c.	Paris
Montana, Lt., G. S.	Mont.	$18.75@$20	London
New Albion, G.	N. S	$4.37½@$5 62½	London
New Emma, s.	Utah	$1.50@$1.50	London
New Hoover Hill, G S	N. C.	$1.37@$1 62	London
Plumas Eureka, G.	Cal	$3.12½@$4 37½	London
Richmond Con. S. L	Nev.	$20@$21.25	London
Ruby & Dunderberg, G.	Nev.	$1 75@$2.25	London
Sierra Buttes, G	Cal.	$5.62½@$6 87½	London
St. Joseph's, L	Mo.	$7@$7.50	Unlisted

Foreign quotations are per mail advices.

* The above quotations were given July 5th, 1885. Since then, there have been no quotations.

BOOKS ON COAL.

Rare Books and Books on Coal, Coal Mining, Metallurgy, and Engineering are made a special feature; but books of all kinds will be furnished, post-paid, at publishers' prices.

ANDRE, GEORGE G. A Practical Treatise on Coal Mining. 2 vols. royal 8vo, cloth. Lond. 1878. $28.

ATKINSON, J. J. A Practical Treatise on the Gases met with in Coal Mines. 16mo, boards. N. Y. 1875. 50 cents.

ATKINSON, J. J. Friction of Air in Mines. 12mo, boards. N. Y. 1879. 50 cents.

ATKINSON, J. J. A Practical Treatise on Mining Machinery. 2 vols. 4to, cloth. Lond. 1878. $28.

BAILES, W. The Student's Guide to the Principles of Coal and Metal Mining. Vol I. (only). 8vo, half morocco. Lond. 1879. $8.

BELL, I. LOWTHIAN, F.R.S. Notes of a Visit to Coal and Iron Mines and Iron-Works in the United States. 8vo, paper. Lond. 1875. $1.

BOYD, R. N. Coal Mines Inspection, its History and Results. 8vo, cloth. Lond. 1879. $6.40.

COAL. Its History and Uses. Edited by Professor Thorp. 8vo, cloth. Lond. 1878. $3.50.

COLLINS, J. H., F.G.S. Principles of Coal Mining. With 139 illustrations. 12mo. Lond. 1876. 50 cents.

FAIRLEY, W. The Theory and Practice of Ventilating Coal Mines. 12mo, boards. N. Y. 1882. 50 cents.

GALLOWAY, ROBERT L. History of Coal Mining in Great Britain. 12mo, cloth. Lond. 1882. $2.

GOODYEAR, W. A. The Coal Mines of the Western Coast of the United States. 12mo, cloth. $2.50.

HARPER, J. POVEY. Working Drawings of Coal Mining Plant. Illustrated by 31 Plates. London. Folio, cloth. $18.

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MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above Post-offices, March 1st 1880. Scale, 1 inch : 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch : 10 miles. Size, 26×30 inches. Pocket form, $1.50; as a wall map, $2.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet · Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties: Astronomical Positions; Arable Land. Scale, 1 inch : 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53×41 inches. Printed in colors. Pocket form, $5.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored. 1884. $3.75.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 × 38 inches. Pocket form, stiff paper cover, $1.50; or as a wall map, $1.50.

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DIVIDENDS.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY, 23 NASSAU STREET.
NEW YORK, Feb. 26, 1885.
DIVIDEND NO. 34.

The Board of Trustees have declared a dividend of TWENTY-FIVE THOUSAND DOLLARS, the same being *twenty-five cents* per share of the capital stock of the company, payable on the fifth day of March, at the Company's offices in New York and San Francisco.

W. VAN NORDEN, President.

MEETINGS.

OFFICE OF IRON SILVER MINING COMPANY, MILLS BUILDING, 23 BROAD STREET,
NEW YORK, Feb. 9, 1886.

The annual meeting of stockholders of this company for the purpose of electing trustees to serve for the ensuing year and for the transaction of such other business as may come before the meeting will be held at this office WEDNESDAY, March 3d, 1886, at twelve o'clock. Polls close at one o'clock P.M.

Transfer-books will close February 26th, at three o'clock, and reopen March 6th.

HOMER A. HOIT, Secretary.

TO THE STOCKHOLDERS
OF THE
PENOBSCOT & SNOWDRIFT
CONSOLIDATED MINING COMPANY OF MONTANA:

Pursuant to a decree (filed December 17th, 1883) of the District Court of the Third Judicial District of the Territory of Montana, in and for the County of Lewis and Clark, the undersigned Trustees, appointed by said Court, do hereby notify any and all stockholders of the Penobscot & Snowdrift Consolidated Mining Company of Montana,

That, in accordance with the instructions of said Court, they have sold and caused to be sold all the remaining property of the said Company of every description; and

That, after paying all the debts and obligations of the Company, they have left to be divided among its stockholders an amount equal to (12) twelve cents per share; and

That, pursuant to the direction of said Court, they have declared a dividend of (12) twelve cents per share as a final dividend, in liquidation of all the assets of the said Company, payable February 5th, 1886.

Each and every stockholder of the said Company is hereby further notified that upon sending in the certificate or certificates of stock, duly assigned by the REGISTERED OWNER, to GEORGE F. PEABODY, *Trustee in liquidation*, a check for an amount equal to twelve cents per share will be at once forwarded.

Certificates upon which Dividend No. 1 in liquidation, due December 1, 1882, has not been paid, will also receive, in addition, the amount of that dividend, viz.: twelve cents per share. *Certificates on which Dividend No. 1 has been paid are so stamped.*

Certificates should be sent to GEORGE F. PEABODY, Trustee, 16 Broad Street, New York City.

NEW YORK, January 30th, 1886.

SPENCER TRASK,
NATHAN S. VESTEL,
GEORGE F. PEABODY,
WILLIAM MUTH,
SAMUEL SCHWAB,
GEORGE VOSS,
FRANK E. LOWRY,
Trustees appointed by order of Court for the liquidation of the assets of the Penobscot & Snowdrift Consolidated Mining Company of Montana.

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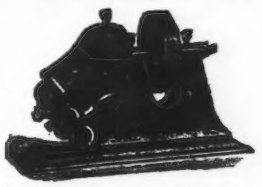

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Fig. 1

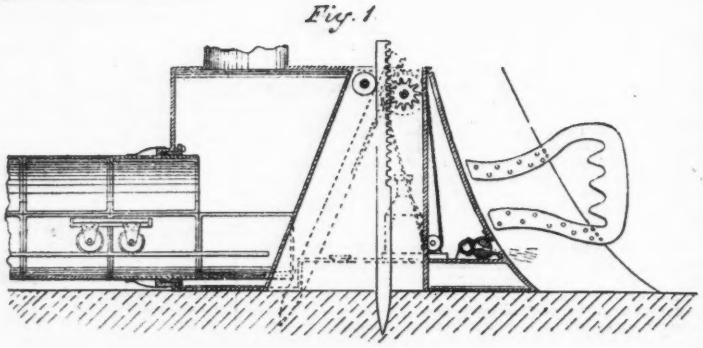
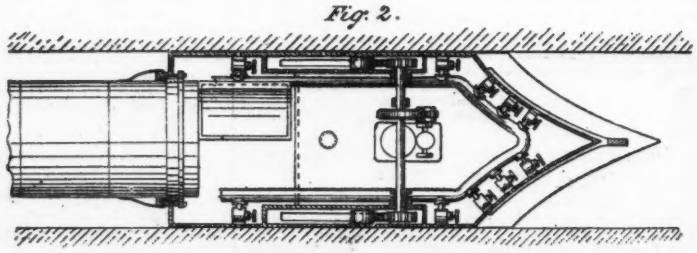
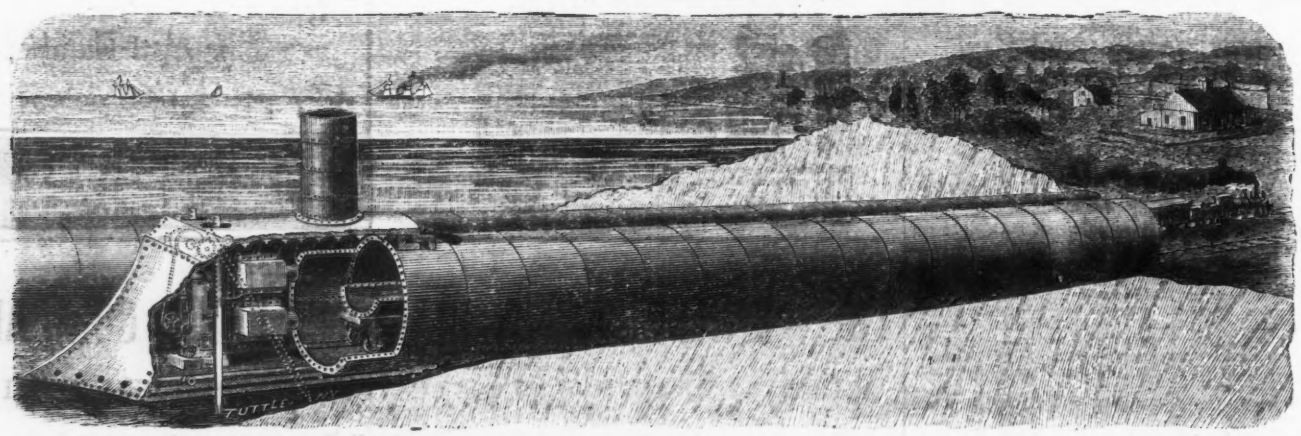


Fig. 2.





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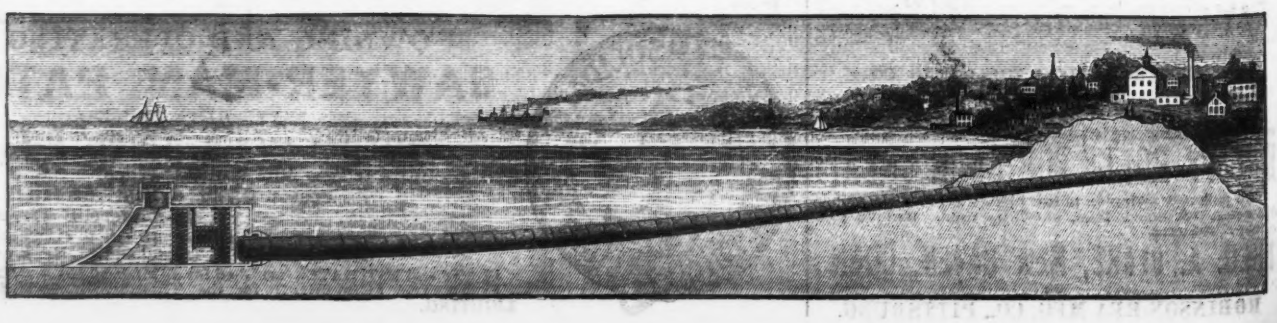
This cut represents a tunnel laid out into a lake, caisson arranged for a filterer, that can be cleaned at will. Mains from 30 inches to 10 feet can be laid at any depth or distance by this system.